TELEPHONE ENGINEER

Vol. III CHICAGO, JUNE, 1910 No. 6

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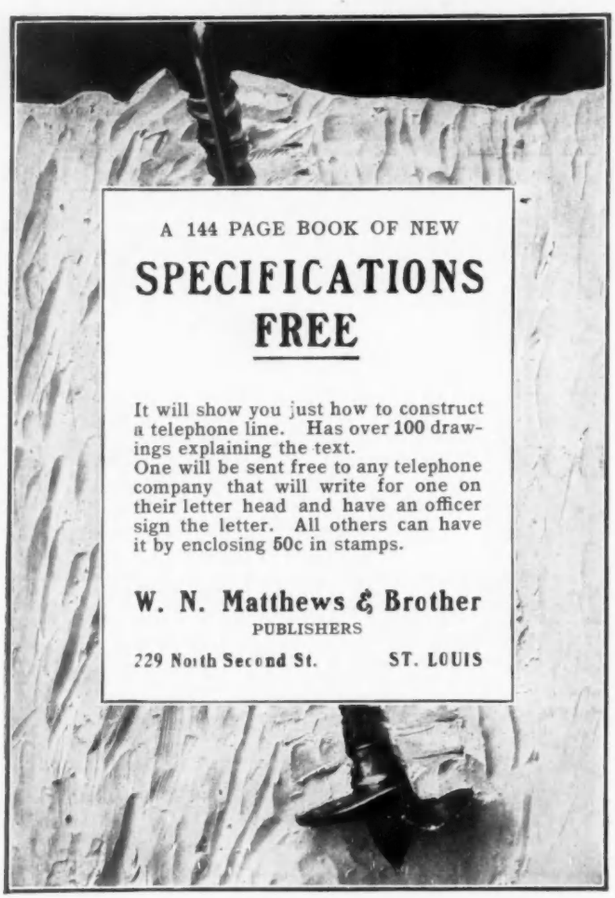

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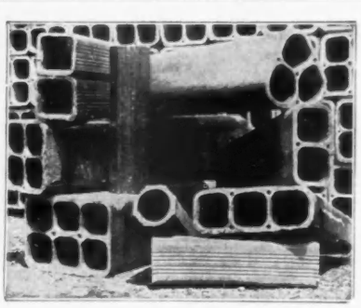

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CHICAGO, JUNE, 1910.

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THE PRICE OF EQUIPMENT.

THE word perfection, used in a commercial sense, is never wholly superlative. What is perfect today is obsolete tomorrow; the final step in development today is but to the threshold of tomorrow's broader understanding.

The telephone equipment produced by American manufacturers is as nearly perfect to the day of its production as any commodity whose very existence depends upon development and improvement, can well be. Its evolution has progressed through times good and bad. Periods of commercial activity have brought special requirements, unusual refinements in engineering and mechanical detail, to meet the exactions of high efficiency operating. Periods of commercial depression have given the designers and the venders of equipment opportunity for introspection and study, and again the product has made a step forward and upward. Perfection is always progression.

The operator, in calculating his profits, must contend with the elements of decrepitude and obsolescence. Decrepitude is obviously a process of nature. Obsolescence he sometimes regards as purely a process of business—the making of a market for new equipment by antiquating the old. If the designer should refrain from designing, and the inventor quit inventing, depreciation would cease to be complicated by obsolescence, and we would need new equipment only when we obtained new business, or when, in the distant future, our plant wore itself out and disintegrated like the deacon's one-hoss shay.

This seemingly idyllic condition, however, has been tried and, unfortunately, found wanting. No man can progress without adopting, unreservedly the progeny of progression; and to these the designer and the inventor are foster-parents. To refuse them recognition is inevitably to make way for those who will accept them.

So we must buy equipment not only to supply the demands of new business, not only when that which we have is worn out, but also, within reason, when some one offers us a better article, a more efficient contrivance, than we are using.

Improvement in telephone apparatus has been, and is, exceptionally rapid. It has gone steadily on, through good times and bad, whether there was a market or not. And the manufacturer has paid the bill. He, too, has his depreciation and his obsolescence; for new designs require new machines, new tools, perhaps even a new plant. Competition—a stimulant, not a spur—has intensified the cultivation of new ideas; but it has also held each new device to the value of the old one. Development, to the manufacturer has not meant better prices for his goods; it has meant merely his ability to stay in the game.

Competition between telephone manufacturers never has been closer than it is today. Prices of telephone ap-

paratus never have been lower than they are today. Granting that competition reduces prices, it would seem that given enough competition, there would be no prices. This proposition, indeed, is not so absurd as it looks; for if eight manufacturers incur expenses of a hundred dollars apiece, to the end that one of them gets a three-hundred dollar order, there is obviously a balance on the wrong side of the ledger somewhere; and, equally obviously, sometime the buyer must pay for it. *He has not had to yet.* But the result of this condition must inevitably be either the ultimate annihilation of some of the manufacturers, or the adoption by them of a sales system and a price system that shall remedy the trouble. Among admittedly intelligent men who desire to stay in business there can be but one answer. It is hard to raise prices in the face of active competition; but it is harder still to contemplate a loss where profit is the object of business.

The prices of telephone equipment must go up; not because the operator will pay more; not even because everything else is going up; but because there is no other way in which the manufacturers can continue to do business.

There is always some kind of equipment that any operator will have to buy before long. At most he can only put it off for a few months. It is the most elemental form of wisdom to buy when prices are low—*and they are low now.* They cannot continue to be so for very long.

THE SWIFT LITTLE GAME IN CHICAGO.

THINGS are moving fast in Chicago. The Chicago Telephone Company is in a regular little whirlwind of excitement just now. Under the present ordinance the company's accounts are supervised by representatives of the city comptroller. Also in accordance with the provisions, the city council committee on gas, oil and electric light is undertaking a revision of the telephone company's rates. So the company is placed in the position of having to prove that its present rates are too low, while with its other hand it must fight off impending competition in the shape of the independent system being installed by the Chicago Subway Construction Company.

The independent company has stated that it has no fight with the Bell company in Chicago. Evidently, however, the Bell company cannot say as much. An important function of the new company, from an independent standpoint, is its ability to connect Chicago with all the outside independent territory which is clamoring for an audience with the big city. Such connection would logically be established through the lines of the Inter-State Telephone and Telegraph Company, independent, operating in Aurora, Joliet and other cities convenient to Chicago, and owning a network of valuable toll lines over the northern part of the state. The Chicago Telephone Company could not block the independents' play inside Chicago. Its logical move, then, was to block the approach to Chicago. Dispatches state that the A. T. & T. Company closed negotiations for the purchase of the Inter-State company last week.

The Chicago Telephone Company has indicated by its advertisements in the local papers that it has never considered the independent invasion in the light of a joke. Presumably the big company was a little worried, between the city's rate revision and the independent's headway. The rate revision alone is sufficiently complicated to demand all the attention of even a big corporation, without any outside distractions.

It so happened that the city of Chicago, in casting about for a corps of experts to handle the difficult problems of determining the cost of telephone service, decided to accept the services of Messrs. D. C. and W. B. Jackson, engineers, and Arthur Young and Company, accountants. These gentlemen, co-operating, prepared a report which was submitted to the council May 9. This report covered the cost of telephone service in Chicago for the year ending March 31, 1910. Ostensibly it proved that the Chicago Telephone Company suffered a loss of $908,533.52 during that period. In other words, the company, according to the figures, had a net revenue for the year of $890,-984.99, with which to pay 5 per cent interest on $3,-819,590 worth of bonds (in Chicago) and an eight per cent dividend on a capitalization (in Chicago) of $21,-057,786. Inasmuch as the net revenue amounted to but 3.83 per cent on this investment, while the combined obligations of dividends and bond interest amounted to 7.74 per cent; and inasmuch as the interest and dividends were paid, notwithstanding the seeming impossibility of meeting them under the circumstances, it devolved upon the telephone company to explain that these payments were made from the fund provided for depreciation of property. As a natural result of this rather startling revelation, Chicago Telephone stock dropped to 110. It got back as far as 116, however, a few days later, when the minor stockholders had toasted their feet over the prospect of higher rates.

In the face of such a report, the council committee can hardly be blamed for suspecting the presence of a colored person in the accumulation of ligneous material. When they "forced the admission" that Young and Company were regularly employed by the telephone company—an open fact, which was well known to every one else—the cry of treason arose. The gentlemen of the council were too familiar with the psychology of serving two masters to see that a report of this kind is a matter of fact, not of efficiency. So the report, which cost the city $8,000, was discarded; and it is proposed to undertake a thorough inventory and appraisal of the telephone company's property, which operation will take a year and cost at least $60,000.

An appraisal similar to the one proposed in Chicago has just been made in Boston and throughout Massachusetts generally by Messrs. D. C. and W. B. Jackson, the same engineers engaged on the Chicago report. The Massachusetts report constitutes the most thorough analysis of telephone rates and their causes ever attempted by a public commission. The New England Telephone and Telegraph Company, operating in that territory, is, like the Chicago Telephone Company, a subsidiary Bell company. It operates under much the same conditions as govern the Chicago company, although the number of instruments involved in the investigation is lower. It is a well known fact that the cost of sending telephone service increases as the subscribers increase in number; yet the Jackson report states that the minimum average cost of giving service in Boston (on the four-party coin-box telephone) is $20 per year. There is nothing to doubt, therefore, in the Chicago company's claim that it is losing money on its $18 four-party residence service. But in Boston the profits on other types of service are such that the Jackson report rec-

ommends a revision of rates involving a reduction amounting to nearly $4,000 annually. The Chicago report seems to show that the company is losing money on its unlimited single business line service at $125; its measured single business line with rented p. b. x. board; its commuted rate single business line with p. b. x. board; its extra line service for use in connection with the latter; its auxiliary line service, for incoming messages; its unlimited single residence line at $72; its unlimited two-party residence line at $56; its prepaid nickel two-party residence line at $36 guaranteed; its prepaid nickel four-party residence line at $18 guaranteed; its extensions at $6; and all of its "neighborhood" classes of service except trunked calls at 5 cents from such lines.

Its books show profit on straight measured single business service; on prepaid nickel single public lines from drug stores or other approved locations; on prepaid nickel single business line service; on prepaid nickel two-party business line service; on 5-cent trunked calls inside the city; on mileage extension lines and on private lines.

In trying to explain away the apparent deficit in the telephone company's accounts, the council committee declared that the company's regular dividend of eight per cent is too high, and that six per cent should be ample return to investors. City Auditor Willard asserts that the lower figure prevails in the east, although he fails to cite any definite examples. It is also claimed that the expert's allowance of seven per cent for depreciation is excessive, and that four per cent is ample.

It is true that some public service corporations find six per cent dividends satisfactory to their stockholders. But it must be remembered that the Chicago Telephone Company may become the property of the city nine years hence, and in that event the private capital involved must seek new investments. The eastern companies to which City Auditor Willard undoubtedly refers, as for example the New England T. and T., in many instances operate under exclusive franchises, and in some cases under perpetual or very long term franchises; and their consequently greater appeal to capital would account for the lower dividend rate. Eight per cent is none too much in the conditions under which the Chicago Telephone Company operates.

The item of seven per cent for depreciation is the figure of the experts, and not of the telephone company. When President Sunny stated that last year's interest and dividends were partially met out of the depreciation fund, he meant merely that the company had not allowed so great a depreciation figure as did the experts' report. The Messrs. Jackson are recognized authorities on that subject, and their recommendation of a seven per cent fund is well advised by experience. It must be remembered that the report was prepared after the company's expenses had been apportioned. It does not necessarily indicate that the company will lose money next year, even if it provides seven per cent for depreciation instead of four per cent. The depreciation as figured by the experts was $1,578,922.20 for the year. The company's allowance for the same purpose, at four per cent, was about $900,000. The difference between the two figures reduces the apparent deficit considerably.

Telephone rates in Chicago are not too high at present. Whether they are high enough is a matter for the experts to decide. They certainly are if the item of depreciation is neglected; but if the city of Chicago is to take over the property of the Chicago Telephone Company in 1919, it would be the part of wisdom to allow the company enough to keep that property from becoming decrepit and obsolete. The city at that time has the option of purchasing at the cost of duplication plus five per cent. If decrepitude and obsolescence are allowed to take their course without adequate hindrance for nine years, there may be a discrepancy between the cost of duplication and the appraisal value of the property that will give the city a pretty poor bargain.

The council committee has invited Professor D. H. Meyers, chairman of the Wisconsin Public Utilities Commission, to come to Chicago and assist the subcommittee in devising ways and means of getting an authentic report on the financial standing of the telephone company. Professor Myers' disclosures to the committee on the subjects of depreciation and rates will be interesting.

WIRELESS.

IF ordinary telephone is wonderful, we must admit that wireless telephony is among the most marvelous manifestations of natural laws discovered since the world began. Handled with a view to its present limitations as well as to its future possibilities, the commercial stability and importance of wireless telephony would become established. Our regret, then, is the more poignant that exploiters of the art have seen fit, in many cases, to place more importance upon the sale of stock than upon the legitimate development of the fields of logical applicability. The effort to convince the public—especially the investing public—that wireless is destined to supersede the transmission of intelligence by wire is ill-advised and abortive.

The technical development of wireless apparatus has been rapid until recently. Now there seem to be indications that the limit has been almost reached along present lines of investigation. The reason for this is found, according to John L. Hogan, Jr., in the *Electrical World*, in the continued attempts of inventors to overcome difficulties which are inherent to the apparatus used. He says:

> Current losses in shunt paths through the ground bar the conductive method from use. In the inductive method the distance covered is a function of the current in the transmitter's large inducing coil; this current must be modified by passage through a microphone; present-day microphones have a rather low-current carrying capacity, and so the maximum effective distance of a low-frequency induction wireless telephone is small.
>
> The wave method is without doubt the best so far proposed, but both the arc and the alternator types have their limits. The distance over which speech may be had of course depends on the energy radiated effectively, and no more energy may be radiated than may be reliably and effectively controlled by the voice. Since the voice can control no greater current than the microphone system will handle, the limit of existing microphones affects Hertzian telephony. In addition to this restriction of output, experience has shown that the arc is not operative at high rates of emission, and that the limit of its power (i. e., the maximum activity in its oscillation circuits) has been found. The infrequent use of alternator oscillators does not supply any data as to their operating difficulties, but the great cost of their design and construction makes them impossible for general use at present.
>
> It is, then, quite evident that future systems of wireless telephony must either eliminate the use of microphone transmitters or find types far in advance of those used today. In addition to this, some more powerful and more reliable oscillator must be substituted for the arc. If no great difficulties arise in its operation, and its cost be sufficiently reduced, this substitute

may be the high-frequency alternator. With the few weak points of the present system removed and the useful parts of the apparatus retained, the wireless telephone will come into all the users to which it is adapted; but the elimination of the defects will involve a departure from present methods. Until these are discarded, attempts at commercial wireless telephony will be futile.

PUTTING WIRES UNDERGROUND.

LAST month TELEPHONE ENGINEER told something of the havoc wrought by the devastating sleet storm. A glance at the illustrations given was a strong argument for underground wires. The annual losses by storm where overhead construction is used would pay the interest on a sum sufficient to buy all the important circuits in the country.

There are other arguments besides destruction of property for placing talking circuits underground wherever possible. Captain William Brophy, of the Massachusetts State Firemen's Association, said in a paper read before a recent convention:

To the question "Should Not All Electric Wires Be Placed Underground?" there will be but one answer from the great majority of the people of this country, and that is that they should. The members of the fire departments of the country to a man will say yes, for the reason that they know that they are an obstruction to them in the performance of their duty and also a menace to their lives and limbs and liable to bring death within their ranks. It is true that a large number of the overhead electric wires are perfectly harmless in themselves to life and property, as they will not cause dangerous shocks to persons or cause fires within the walls of buildings, but it can also be said that owing to unavoidable circumstances in some instances and culpable carelessness in others, these become equally dangerous with those that are known to be so, and as a matter of fact more so, owing to their well known good character and their inability to cause damage of themselves. The great majority of firemen and other people will carefully avoid contact with electric light and power wires, but there are many—yes, altogether too many of both classes who will not hesitate to handle low tension wires, such as telephone, telegraph, fire alarm and police signal wires, etc., believing them to be perfectly harmless, yet they may at that moment be charged with a "deadly" current from some high tension electric wire, and when such is the case serious consequences will be pretty sure to follow. The great majority of people, and I venture to say the entire membership of the fire departments of the country, believe that the covering on high tension electric light and power wires that are maintained overhead is an insulator and will prevent the escape of the "deadly" current to persons who happen to come in contact with them, but such is not the case, for, as a matter of fact, there has never been an insulating covering produced for high tension electric wires to be maintained overhead that is worthy of the name, that would be durable and reliable and have a reasonable amount of life.

The average citizen will say that all overhead wires should be placed underground, for the reason that the poles and wires are unsightly, an obstruction, and, perhaps, for the further reason that some of the poles stand on the street where they live, and, perhaps, in front of their houses and lots, but few of them think of such poles as an obstruction to firemen and, perhaps, a menace to them while in the performance of their duty, hazardous enough at all times, but rendered much more so at times by them.

The city of Chicago was the first in this country to advocate buried wires for all electrical purposes, and it is noteworthy that the only user of such wires that showed any willingness to co-operate with the city authorities in this direction was the local telephone company. It must be remembered that at that time the manufacture of conduit for underground wires was unknown as an industry, and the work was largely experimental. Numerous materials were tried and proven unsatisfactory, the conduit finally adopted being of sheet iron, lined with cement. In the face of such difficulties, the telephone company's approval of the step was the more remarkable.

There is still some opposition to the adoption of underground wiring among telephone and other wire-using companies. But, strange as it may seem, the majority of protests against the burial of wires come at present from the city governments, while the more enterprising companies are trying to secure underground franchises. The reasons for this opposition lie in the theories of some public officials that such franchises tend toward monopoly, or that they operate to discourage the prospect of ultimate municipal ownership.

The obstacles which stood in the way of early underground construction have largely been removed. We now have a variety of efficient conduit materials; we have wire and cable insulations, which will stand up under the rather severe conditions of underground work; we have perfected systems of subterranean installation that reduce the cost to the minimum. If the telephone companies clamored for underground franchises in 1882, they have every reason to demand them today. The difference between open and buried construction is maintenance alone, while perhaps not so great as might be imagined, is sufficient to discourage the extensive building of new overhead lines.

It is within the power of operating telephone companies to retire permanently the oft-repeated press announcement "Telephone and telegraph wires are down and all communication with the city is cut off for the present." A big step in this direction has been made by the American Telephone and Telegraph Company, in making application for permission to lay conduits in Maryland along the state road between Philadelphia and Baltimore, and continuing on to Washington.

This move is a part of the plan of the company to inaugurate a general conduit system which will connect all of the important cities throughout the country. The company decided to take this action as a result of the inconvenience caused by the great storm of March 4, 1909, the date of President Taft's inauguration, when, through the collapse of overhead wires, communication was practically cut off. The recent storm in the vicinity of Cleveland, with its consequent demoralization of communication, was also a factor in the company's determination to have an underground system.

The wires in our great cities are already underground. It remains but to bury the lines between these important points to make telephone communication far more certain and dependable than railroads, or, indeed, any other form of transmission.

NIGHT LETTERGRAMS IN CANADA.

THE Montreal *Gazette* reports that, on account of the success of the system in the United States, the Great Northwestern and Canadian Pacific companies applied the service to all points in Canada on March 13, known as the night lettergram service. This means that the two companies will accept night letters for transmission to any of their connections in Canada or the United States for delivery the following morning. Under this rule, a night letter of fifty words or less can be sent at the rate regularly charged for a ten-word message, with a charge of one-fifth the day rates for each additional two words. The ordinary mailing service, with the long distances in Canada and the United States, may mean a delay of several days, while by this system letters will be on the desks of the recipients the next morning.

The New Exchange at Monmouth

By Gifford Wheeling

THE work of cutting over the telephone service of Monmouth, Illinois, to the switchboard equipment recently installed in the fine new home of the Monmouth Telephone Company has been completed. Two companies in Monmouth have recently consolidated, and the work of installation has been in progress for some little time.

Converting the entire city's telephone system to common battery and at the same time bringing together under one roof the connections of the telephones of two companies was the problem that confronted the installation force. The task of cutting over was an arduous one. It was accomplished at the rate of one hundred telephones a day.

The New Exchange at Monmouth, Ill.

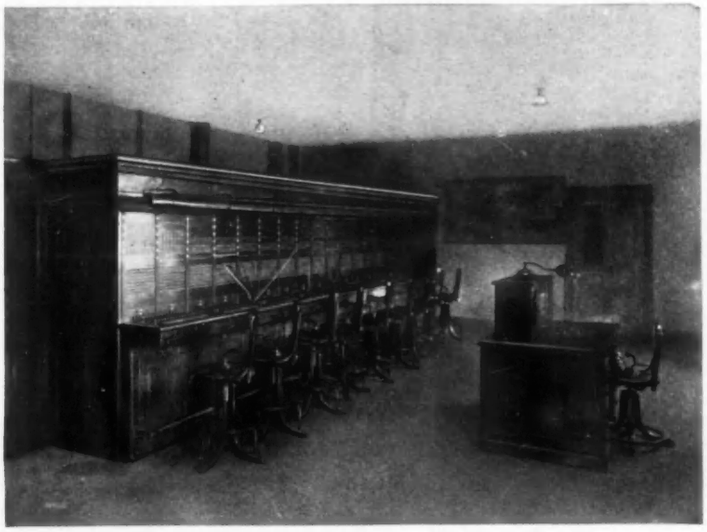
With its new facilities the Monmouth exchange is one of the best equipped of its size in Illinois. The switchboard has capacity for approximately 4,500 city and rural subscribers. It can accommodate nine operators, and has facilities for operating thirty toll lines directly for night service. All apparatus in this switchboard is mounted on a rigid iron frame, the woodwork merely forming a coving and arranged so as to make the apparatus accessable

The line circuit in this board employs a double wound clickless line relay and a cut-off relay supported on a common mounting. When a subscriber who desires a connection removes his receiver, current flows out through the double wound line relay, the operation of which lights the line lamp.

The rural line circuits with which this board is equipped are terminated with combined jacks and signals of the self-restoring type. When the signal is in its normal inoperative position it presents a dead black surface to the operator. When it is thrown by a subscriber calling, a red surface is displayed, which turns again to black when the operator inserts her plug in answering the call.

In the rural position of this board "combination" cord circuits are installed. They are arranged so that connections may be made between rural and common battery subscribers, or between rural and rural or toll lines, irrespective of the characteristics of the lines so connected. These cord circuits automatically adapt themselves to any condition which may arise.

A Monson Maine slate fuse panel has been installed with this equipment to provide for fusing all circuits. These fuses are of the indicator alarm type. When a fuse is blown a pilot relay is operated, which in turn lights a pilot lamp. This relay closes a circuit through a loud ringing bell, thereby giving an audible signal. Each fuse is equipped with a glass bead, which forms a visual signal to facilitate in locating a blown fuse.



The Monmouth Operating Room.

The subscribers' bells will be rung by means of the so-called harmonic system which employs four-frequency currents, one frequency being used for each of four parties on one line.

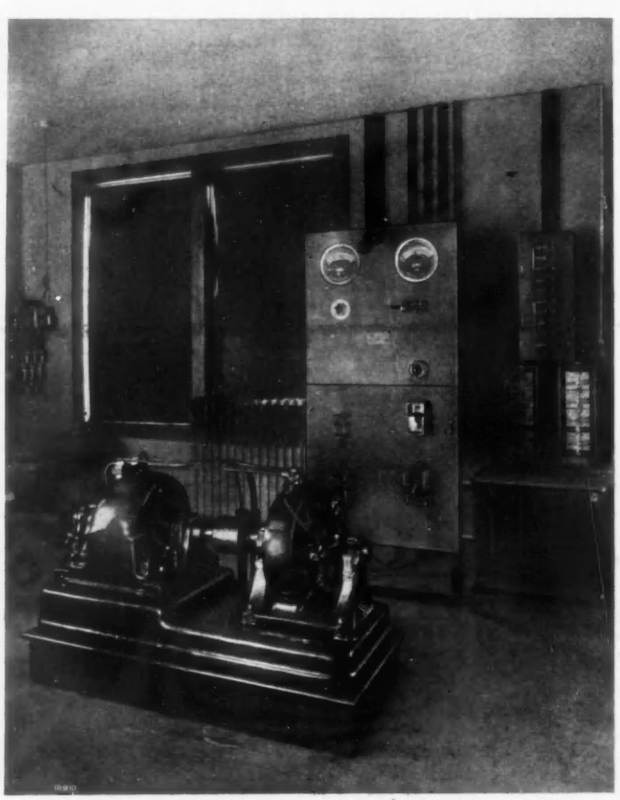
By this means any one party on a line may be signaled from the switchboard without disturbing other parties on the same line.

With this switchboard has been installed a chief operator's desk, which contains trunks to the subscribers' switchboard, wire chief's desk and manager's desk, and is provided with monitoring circuits and service observation lines for properly supervising the work of the operators and determining the character of service given by each. These lines provide for making connection to a subscriber's line upon which complaint has been made, so that it may be determined whether the subscriber or the operator is at fault.

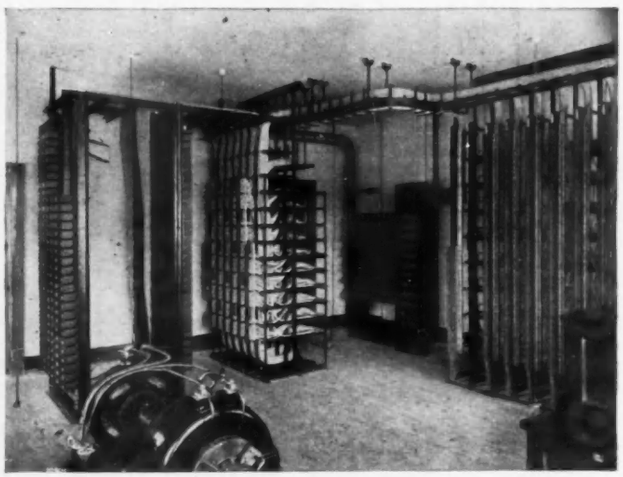
A wire chief's desk also was installed with this equipment. It has a capacity for ten testing trunks to the switchboard as well as testing circuits to the toll desk and test lines to the main distributing frame. This desk is of the cordless type, and is arranged to give maximum efficiency in locating and remedying trouble in the inside circuits as well as on the outside lines.

A complete power plant has been installed to supply energy for operating this exchange. A set of storage batteries has been provided with ample reserve capacity to carry the exchange load in case of fire or other catastrophe crippling the city power system.

The motor generator set installed in the Monmouth office consists of a single-phase self-starting motor direct connected to a noiseless charging generator of special construction. In case of accident to the storage battery ordinarily used for supplying energy to the switchboard, the charging generator may be used to supply energy direct. With this arrangement of a storage battery and a noiseless charging generator, it is practically impossible to cripple this telephone system, which has been made a unit in itself.



The Power Plant.



View of Terminal Room.

A modern toll board has been installed with this equipment. The toll circuits are terminated on this board by means of the combined jacks and signals. The accompanying illustrations are views of the new telephone plant at Monmouth. The switchboard is of the Western Electric "Number One" type, the entire equipment being designed, manufactured and installed by that company.

Left-Handed Telephone Users

"Right-handed people invariably put a telephone receiver up to their left ear, and left-handed people to their right ear," says a telephone operator. "We girls get to be psychologists in a small way by talking over the telephone every day. It is impossible to keep from sizing up and classifying people on the other end of the wire, simply on a basis of what they say and how they say it.

"There are almost as many ways of talking into a telephone as there are kinds of people who use the telephone, but it is, nevertheless, rather easy to classify them. One thing I have noticed is that the vast majority of people, being right-handed, hold the receiver in their left hand. The left ear, by long practice, thus becomes more acute and well trained. Consequently, when for any reason a man or woman takes the receiver in his or her right hand, it is comparatively easy to sense it at my end. The man is apt to speak nervously and disjointedly, to talk too loud and to ask me frequently to repeat, showing that his ear—his wrong ear—is not serving him with such fidelity and accuracy as his more accustomed left."

Hear Heart Beats 100 Miles

A test that was carried out recently shows it is possible to diagnose heart troubles by telephone a distance of one hundred miles. The experiment was conducted between Mr. Milne's house on the Isle of Wight, where the seismologist and four physicians using an ordinary telephone, listened interestedly to the beating of a woman's heart in London. A stethoscope, held over her heart in the familiar manner, was attached to a telephone recently invented by Sydney Brown, by means of which sounds are magnified.

The Joint Convention at South Bend

THE Independent telephone associations of Indiana and Michigan held a joint convention at South Bend, Ind., May 11 and 12. It was the fifth annual convention of the Indiana association and the thirteenth for the Michigan organization. The officers of the Indiana association present were: President, Charles S. Norton, Indianapolis; secretary-treasurer, Allen J. Payton, Rockport; and assistant secretary, J. W. Coffey, Indianapolis. Theodore Thorward, president of the Home Telephone Company of South Bend, was a member of the executive committee and vice-president for the first district of the association.

The Michigan association officials present were: President, E. B. Fisher, Grand Rapids; secretary, W. S. Vivian, Grand Rapids, and treasurer, A. C. Himebaugh of Burr Oak.

George Thorward of South Bend was chairman of the reception committee of nine, five of whom were from Indiana and four from Michigan.

The Indiana association held an executive meeting in the auditorium of the Elk's Temple the afternoon of Wednesday the eleventh, while the Michigan body held a similar session in the banquet hall of the Oliver hotel. The fifth floor of the hotel was occupied by manufacturers' exhibits.

The features of the meetings of both the Indiana and Michigan associations Wednesday afternoon were the annual addresses of the presidents.

President Norton of the Indiana association recounted the history of the independent telephone movement in Indiana, and declared that monopoly in the telephone business was a thing of the past. He congratulated the telephone men for their persistence and tenacity which made such a thing possible. He discussed the necessity for better rates, and the element of depreciation as a factor in rate making and development. In speaking of independent securities he said:

"As a rule a business that is wholly restricted to one community must be financed within the community. As this is the case with the majority of our independent telephone properties, it becomes necessary for us to find a home market for our stocks and bonds. To make them attractive as an investment, it is necessary that dividends and interests be both earned and paid. There is a vast difference between gilt edged securities and gilt edged stocks and bonds. The former are worth face value and better; the latter, worth one-quarter of a cent per pound. If a dividend is earned, it should be paid. Men have invested in the original stock issue of a company before it went into operation upon a reasonable prospectus which showed safe earnings upon the investment, who could not be induced to buy securities of the same company after it had been in operation two or three years. The management, instead of paying dividends which had been earned, used the net earnings to extend the property. Here has been one of our greatest errors. The demand for our service being greater than we anticipated, our original capital proved inadequate. Not wishing to refuse business and not desiring to go to the public for more capital we used our net earnings for extensions, thus estopping ourselves from paying dividends upon our stock. When finally we are compelled to go to the investing public for additional capital, we find no market for our securities, because they are not dividend paying. By not paying dividends in cash that were justly earned, we have closed the financial gates against ourselves. It is much better to cease taking on new business and pay dividends on securities already issued than it is to forego paying dividends in order to put the net earnings into enlarging our properties.

"Dividend paying securities are always salable in a home market. Once having developed a market for our securities, there will be no trouble in getting all the capital necessary to extend our properties as the business increases."

President Fisher of the Michigan organization declared that the history of the movement in that state up to the present time had been encouraging and that the outlook was optimistic. He advocated an equalization of the burdens of all independent companies in the matter of tolls so that none would feel that they were standing more of the expense than that to which they were entitled.

Wednesday evening Theodore Thorward of the Home Telephone company of South Bend and Mishawaka, was host at a spread at the new Mishawaka hotel, complimentary to the Indiana and Michigan Independent Telephone associations. It was served at 8 o'clock in the main dining room, and over one hundred enjoyed the affair, which was delightfully informal. Following the dinner came informal speeches, Mr. Thorward acting as toastmaster.

E. B. Fisher of Grand Rapids, president of the Michigan association, responded to an address of welcome given by Mishawaka's mayor.

George W. Beers, of Fort Wayne, introduced as the oldest telephone man in Indiana and who taught Mr. Thorward the telephone business, told of the organization of the independent company in Fort Wayne in 1895 when the Central Union company had five hundred telephones there. Now the independent company has 6600 telephones there. He related how Mr. Thorward came to South Bend and Mishawaka and that now in St. Joseph county there are over 6,700 home telephones.

Charles Norton, of Indianapolis, president of the Indiana association, gave one of the best addresses of the evening, showing what had been accomplished in fifteen years in independent telephone extensions in the state.

City Attorney W. P. O'Neill of Mishawaka told of telephone conditions fifteen years ago, and compared that time with the present.

Hon. N. C. Hunter, of Wabash, gave a strong talk and President Thorward in closing spoke of the growth of the telephone business in Mishawaka. He said, "Eight years ago the Bell company had 200 telephones here, nearly all party lines. The Home company secured a franchise, and today it has over 1,100 telephones here, and is supported by the people." He thanked the citizens of this city for that support.

The joint session of Thursday morning was opened with the invocation, pronounced by Dr. William Forney Hovis. Welcome to the visitors was extended by Rome C. Stephenson, on behalf of the city in the absence of Mayor Goetz, who was unable to be present. The welcome was responded to by Hon. E. B. Fisher. Mr. Fisher

said the joint meeting of the associations was of unusual significance, in that it signified the union of interests and brought into closer relation the activities, which must be cultivated to make the independent telephone movement general and a success.

The meeting, which was opened by Charles S. Norton, was turned over to Mr. Fisher, who introduced the national president, F. H. Woods.

The organization of a public utilities commission in Indiana to regulate rates of telephone service and to put a stop to discrimination was recommended by Mr. Woods, who discussed at some length the methods used by the opposition in the effort to secure the business of the independents. He stated that in Indiana alone there are fully 50,000 stockholders in independent telephone operating companies.

Following the address of Mr. Woods, a paper on the subject, "Necessity for Closer Corporate Union of Independent Companies," written by John A. Russel of Detroit, was read by W. S. Vivian, of Grand Rapids, Mich., secretary of the Michigan association, Mr. Russel being unable to be present.

The subject, "Insurance," was presented by J. B. Hoge, of Chicago, an authority on the subject. "Telephone Accounting," was the subject of an address by John W. Coffey, of Indianapolis, manager of the Indiana clearing house. Mr. Coffey presented plans which it is hoped will be put into effect, to increase the facility of adjusting toll line clearings, which he said is one of the most important features of the telephone organization.

"Depreciation," was presented by E. L. Cline, of Indianapolis. He discussed the precautions that must be taken in distributing funds, in order that proper care be taken of depreciation of the value of property and equipment. He showed the per cent which various parts of the telephone equipment depreciate yearly, and stated this fact must be reckoned with, to avoid the entire disabling of a plant in the course of years.

W. S. Vivian read a paper on "Long Distance Operating and Advertising." He stated a wide field of action is presented in advertising, and suggested a number of unique ways it might be used to best advantage. Advertising, he said, is only a means to an end, service being the factor that counts. Operating and advertising ends of the independent telephone business have been neglected, he said, and only in recent years has concerted action been taken by the independents, which, however, has resulted in marvelous returns. Through the medium of the clearing house, improvements are taking place rapidly at present, he said, and it has been demonstrated that even a poor system is better than no system. He believed more care could profitably be taken in issuing directories, in making them more attractive and serviceable and at the same time serving as a better advertising feature.

The program was closed with a talk on "The Necessity of a Toll Line Clearing House" by N. G. Hunter, of Wabash, Ind. This feature of the telephone work is the one that is being given possibly the most attention at present by independent interests.

Reports from nearly every district in the state indicated the independent telephone has become firmly and permanently intrenched. Many companies are contemplating improvements, the total of which will reach millions of dollars. It was reported improvements now under way at Indianapolis will cost $500,000 and new subscribers are being added at the rate of five hundred a month.

J. B. Ware, of Chicago, secretary-treasurer of the National Independent Telephone association, was present and spoke briefly on the independent movement in the west. He stated the people are bound together by the tie that is characteristic of the west, and are making a success of the independent telephone. Several states, invaded only in recent years, have been covered with telephone wires, he reported, and will form an important part of the complete independent system, which he said will be a factor in the near future.

The following resolution was adopted at the joint convention:

"*Wheras,* In view of the fact that in none of the laws defining the powers and duties of the Interstate Commerce Commission is there any provision giving that body regulatory powers over telephone companies, and

"*Whereas,* Public policy and private interest demand the maintenance of effective competition as a protection against monopolistic conditions, excessive rates and inadequate service, Therefore, be it

"*Resolved,* By the Michigan and Indiana State Independent Telephone Associations in joint convention assembled, that we memorialize the members of congress from Michigan and Indiana to use every proper means to secure the passage of such legislation as is proposed in the bill, now pending in the United States senate and house, in which it is sought to enlarge the powers of the Interstate Commerce Commission, so as to empower that commission to establish and regulate rates and service of all telephone companies doing interstate business; to exercise such regulatory power as shall prevent discrimination between persons and communities; and by equalizing charges and rates shall make competition free and open as between the cities of the several states."

Officers as follows were elected by the Indiana Independent Telephone association meeting Thursday afternoon: President, N. G. Hunter, Wabash; secretary and treasurer, W. J. Uhl, Logansport; executive board, Theodore Thorward, South Bend; W. L. Moellering, Fort Wayne; J. A. Brown, Winchester; William Fortune, Indianapolis; Allen J. Bayton, Rockport.

The present officers of the Michigan association were re-elected and it was decided to increase the executive committee from five to seven members. The officers of the association are: E. B. Fisher, of Grand Rapids, president; W. S. Vivian, Grand Rapids, secretary; A. C. Himebaugh, Burr Oak, treasurer. The executive committee is composed of Mr. Fisher, Mr. Vivian, A. E. Barker, of Detroit; W. J. Melchers, of Alma, Mich.; Thomas S. Bromley, Jr., of Hart, Mich.

Suitably crowning what was proclaimed by four hundred delegates a most enjoyable and profitable convention, a banquet of the Indiana and Michigan Independent Telephone associations was served to about three hundred telephone men and their ladies at the Oliver hotel Thursday evening. Theodore Thorward fittingly introduced the several speakers of the evening. Among those whose eloquent addresses contributed to the pleasure of the evening were E. B. Fisher, W. A. Jackson, William Fortune, Joseph Harris, E. A. Stone, J. B. Stoll and M. G. Hunter.

Check on Telephone Complaints

A new policy is to be inaugurated by Commissioner of Public Works Mullaney of Chicago in regard to complaints concerning service by the Chicago Telephone Company. "I will send complaints to the company with a letter attached to each," Mr. Mullaney said. "I will ask for a report in writing from the company as each is received."

How to Read Telephone Circuit Diagrams

By David S. Hulfish

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LESSON XVII.

THE circuit diagram of Fig. 262* shows circuits suitable for the apparatus of Figs. 560 and 561. Two stations are shown. The lower station is calling the upper one. The condition of apparatus is that in which the lower station is ringing the signal bell of the upper station. To emphasize the ringing circuit its conductors are given a heavier line value, making them easily traced.

Ringing current is flowing from the earth symbol of the lower station, as indicated by the arrows adjacent to the conductors, as follows: t', g', t', g', q', l', j', 6, i', z, G, x, c', B, a, L'. The conductor L' is one conductor of a cable which passes to all stations, and this particular conductor is connected to all stations to the left-hand contact point of the switch, according to the fundamental principle of intercommunicating systems as studied in connection with Fig. 559.

At the upper station of Fig. 562, which is the home station of the conductor L', the circuit traced in part in the lower station of the figure is completed

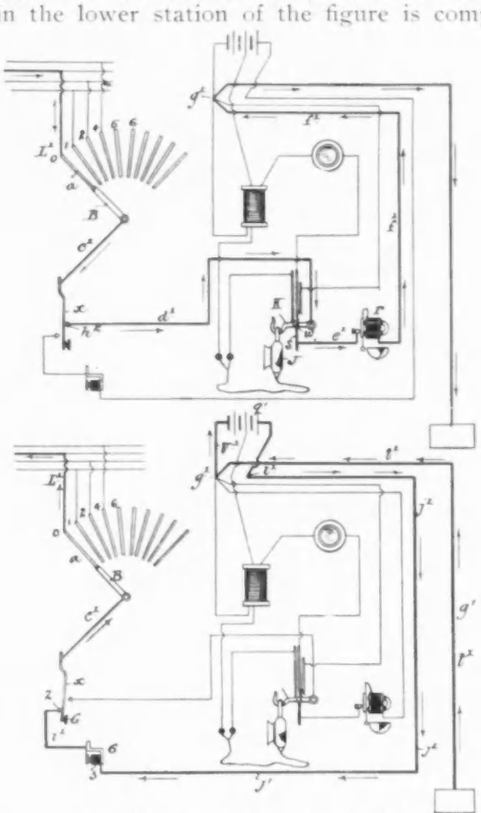


Fig. 562. Intercommunicating Circuit.

through L', a, B, c', x, h_2, d', w, s, e', r, f', g', to the earth symbol.

The battery q' included in this circuit causes a current to flow, but the vibrating bell r causes the current to be pulsating or intermittent. The signal bell r at the upper station is rung, and the resonator 6 at the lower station vibrates its armature in response to the pulsating current, and thus announces audibly to the calling party that he is ringing the bell of the called station.

When the key G of the lower station is released the ringing will cease. The student then may assume that both receivers are lifted from their respective

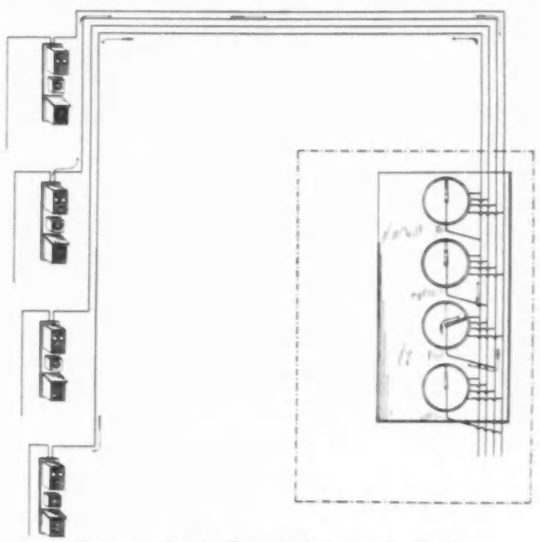


Fig. 563. Simple Theoretical Automatic Circuit.

switch hooks, and the talking circuits may be traced.

In the systems just studied each station has had its own switch at the station, and all wires have been brought to each telephone station. In the diagram of Fig. 563 a distinction is found in the placing of all of the switches at a single point or central office. In this arrangement each of the several telephone stations has its own line wire and its own selecting switch, but the switch is not located at the telephone. This renders necessary some controling devices and systems whereby the telephone station may be able to operate its switch at the central office to connect with the desired line, and later to disconnect from it. Such a system and its modifications are called automatic telephone exchanges. The central office switches are controlled by electric impulses in groups and series and over variant circuits, originated at the substation or directly controlled by the substation telephone. The central office circuits often become very complex.

In the automatic central office, the apparatus consists almost invariably of a set of movable brushes, or sets of them, passing over many sets of fixed contacts and making electrical connection with only one fixed set at any one time. In connection with the movable brushes are electromagnets for moving them or for controlling their movement, and usually a plentiful allowance of relays.

A device peculiar to the automatic central office is the pilot switch. This appears frequently as an auxiliary switch to a larger switch. The object of the pilot

* TELEPHONE ENGINEER, September, 1909.

is to change the central office circuits which are to be controlled from the substation, in such manner that impulses similar so far as the substation is concerned will be effective in different ways or upon different apparatus in the central office.

In one system of automatic telephone switching, the current impulses from the substation are sent over the line conductors separately, with an earth return in each instance. This provides two entirely independent paths for the transmission of signal impulses of current from

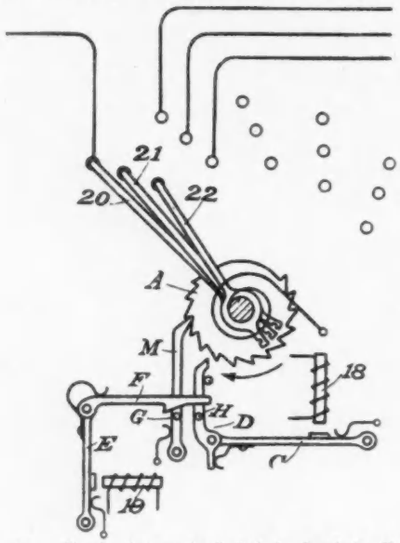


Fig. 564. Simple Automatic Switch in Symbolic Form.

the substation telephone to the central office to control the operation of the central office switches. Of these two paths, in this system one is reserved exclusively for the operation of pilot switches.

In Fig. 564 are shown symbolically a set of movable brushes, movable over sets of fixed contact points, together with the necessary operating electromagnets.

The three movable brushes of the set are labeled *20, 21, 22*. A ratchet *A* is at the same time a means for driving the brushes into the desired position and a means for holding them in that position as long as desired. Propulsion is effected by the magnet *18* driving its armature *C* and pawl *D*. Retention is effected by the pawl *M*. At each operation of the armature *C* the ratchet *A* is propelled through an angle of one tooth and moves the brushes *20, 21, 22* from connection with one set of fixed contact points into connection with the next set.

The switch of Fig. 564 apparently has a normal position in which the conductor permanently attached to the lower end of the longer of the brushes or wipers is in electrical connection with the conductor leading to the left at the top of the diagram. Upon the first step of the brushes when propelled by the ratchet *A*, the three wipers are stepped forward and the three conductors which are attached permanently to the lower ends of the three wipers thus are brought into electrical connection with the three conductors leading to the right at the top of the diagram. By subsequent steps, the three conductors of the three wipers are brought into connection successively with the sets of fixed contacts represented in the diagram by the sets of three small isolated circles, and with such conductors as may be connected thereto.

The object of the automatic switch, in automatic telephone switching, is the selection of a desired one of a number of similar units of apparatus. Because of this general function of the automatic switch, it is to be assumed in reading a diagram that the many sets of fixed contacts with which the wipers may be brought into connection represent each a similar set or unit of apparatus to be selected. Thus, if the three wipers leading to the right at the top of Fig. 564 are found to lead to a substation telephone set, then it is to be assumed immediately that the next set of three small circles are connected to a similar set of three wires leading to a similar telephone set, and so on for all of the sets of fixed contacts represented by three small circles per set which may be found in the symbol available for the wipers *20,21,22*. The selection which is the object of the switch is effected by bringing its three conductors permanently connected to its wipers into connection with the desired set of fixed contacts, whereby the conductors of the wipers are extended to the desired one of the substation telephone sets.

If the three wires leading to the right are found to pass to another selecting switch, the reader of the diagram should assume that the remaining sets of fixed contacts also connect to similar selecting switches.

The desired connection having been "set up" by propelling the wipers of the automatic switch into electrical connection with the required set of fixed contacts, and having been maintained as long as desired, it becomes necessary to release and restore the switch to its original condition.

A spiral spring may be noted upon the ratchet *A*, indicating that when the ratchet *A* is released from the pawl *M* the restoration of the wipers will be effected by the spring. The release is affected electromagnetically.

The release magnet is found as a part of most automatic switches, although a theoretical control of the switch is possible without it. Further, it is typical of the release magnet that it effects the release and restoration of the switch mechanism not upon having its core magnetized, but upon having its core discharged. Such a magnet is embodied at *19* in the diagram of Fig. 564.

By charging the core of the magnet *19*, its armature *E* is attracted. This advances the pawl *F* until the tooth in its lower edge passes over the pin *G* upon the holding pawl *M*. When the core of the magnet *19* is discharged, the armature *E* is withdrawn from the core by a retractile

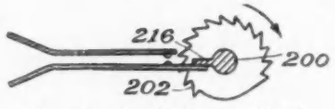


Fig. 565. An Off-Normal Switch.

spring, drawing the pawl *F* to the left as viewed in the diagram and by pin *G* drawing also pawl *M* away from ratchet *A*. The pawl *M* is held away from ratchet *A* until the first subsequent action of the armature *C* when the pin *H* upon the pawl *D* lifts the tooth of the pawl *F* from the pin *G*.

Fig. 565 shows an "off-normal switch." An automatic switch having many positions is described as being in its "normal" position when it is in its position of rest or idleness. When in any of its many other possible positions, it is described as being "off-normal." The two-point switch in Fig. 565 holds its two contact springs separated so long as its associated automatic switch is in its "normal" position, the springs being electrically connected so long as the automatic switch is in any one of its other possible positions, or "off-normal" positions.

In Fig. 565, the shaft *200* is the shaft which carries the wipers of the automatic switch. It is driven by the ratchet *202*. A projection *216* engages the longer of the two contact springs and forces the springs apart. At the first step of the ratchet *202*, the projection *216* moves sufficiently to release the long contact spring and to permit the two springs to make electrical contact, after which it is immaterial to the "off-normal switch" how far the shaft 200 may move to propel its wipers.

(To be concluded.)

Common Battery vs. Magneto

By E. A. Hawkins*

ALL telephone systems are either of two types: First, magneto; second, central battery. This classification refers entirely to the method of signaling. With the magneto system the subscriber signals the central office operator by turning a hand generator. The current from this hand generator causes a drop or other form of signal to be displayed at the switchboard. With the central battery system the subscriber signals the operator by taking the receiver from the switch-hook of the telephone set. In the case of the more common lamp signal type of central battery switchboard this act of taking the receiver from the switch-hook operates a line relay, which, in turn, lights a lamp located before the operator.

There is no question concerning the proper type of telephone system for a small plant having an equipment of 100 lines or less, nor is there any question concerning the larger plant having an equipment of 600 lines or more. The systems usually employed are magneto for the former and central battery for the latter. That these two systems would prove in under these circumstances is well shown by present day practice. In the case of those telephone systems having capacities between these two limits—that is, equipment from 250 to 500 lines—there is much controversy, as is evidenced by the fact that up to the present time there is practically no uniformity or practice. Thus, between these two limits we may consider that we stand upon debatable ground. In selecting the type of switchboard to be used having an equipment between 250 and 500 lines, we should be governed by the local conditions which we will hereinafter describe.

COMPARISON FROM A SERVICE STANDPOINT.

From the telephone company's point of view, the better type of system is the one that will pay the greater dividends. From the subscriber's point of view, the better type of system is the one that will give the better service. The telephone company's point of view must also include the subscriber's point of view, for unless the subscribers are content with the character of service the growth of the telephone company will be stunted and opposition will be invited. We thus see that in the last analysis the character of the service does affect the dividends, and therefore, in determining the type of switchboard, the character of service to be given should likewise be given due consideration.

Since all bridging rural lines and toll lines must be operated on the magneto basis, we can omit them from the discussion. The remaining lines in a telephone system are known as city lines. In general, we have two classifications of these city lines, namely, "Business" and "Residence." The business subscribers will demand the most rapid service, for with them "time is money." The average business man is impatient. He would prefer to signal the central office operator by removing his receiver than by turning the crank of a hand generator. Furthermore, he would prefer to give the disconnect signal by hanging up his receiver, rather than by turning the crank of his hand generator. In case the business man desires to "recall" under certain line conditions, and with certain type of magneto cord circuit, he may find himself "hung up," that is, he cannot operate the supervisory signal at the switchboard, with the result that he may be subjected to an exasperating delay until the operator, by chance, may "listen in."

With a central battery system, each subscriber that is connected through the switchboard has an individual supervisory lamp signal directly under his control. This signal may be operated by moving the switch-hook of the subscriber's set up and down, and when the business man wants an immediate "recall" he can secure the central office operator's attention at once. Since a better grade of toll transmission can be secured on a central battery line than over the average magneto line, the business man is favored by the central battery system.

The residence subscriber is not so keen for rapidity of service, but nevertheless demands a good grade of service. In view of the fact that more rapid and better service can be given by a central battery system, a telephone company that employs the latter system is not so much exposed to new competition. This is self-evident because it is quite essential for a new company, in soliciting business, to have a plea of being able to give better service. Thus, we see that from the service standpoint alone the central battery system is the superior.

COST STUDY BETWEEN A MAGNETO AND CENTRAL BATTERY SWITCHBOARD.

When comparing the differences of first cost between the two types of switchboard, it will be necessary to refer to the maintenance of the telephone set, line and switchboard for a just comparison. This we will outline, as follows: A central battery switchboard, completely equipped for service with an equipment for 300 lines, will cost about $700 more than a magneto switchboard having the same equipment. A magneto telephone set will cost about $1 per year more for maintenance than a central battery telephone set. This item will vary with the same size of territory in which they are located, the use of the telephone and the character of the country. This expense includes inspection, locating trouble, miscellaneous material, depreciation, interest on investment, current from central battery for telephone sets, cost of dry cells and labor for renewing same and repairing magneto generator trouble.

A magneto telephone set will cost about $1 more than a central battery telephone set. This is an item which should be watched, if the idea is eventually to change to a central battery system, as an early start along

*Abstract of a paper read before the Southern Independent Telephone Association.

this line will not only save the difference in cost between the magneto and the central battery telephone sets, but it will prevent having on hand a large stock of magneto telephone sets which cannot be disposed of easily. The expense of maintaining a central battery switchboard should be the same as a magneto switchboard, as they will require an attendant in either case. As a general rule, central battery switchboards require more of the attendant's time than magneto switchboards, on account of attention to the storage batteries and maintaining the relays. In summing up, we have the following items:

Average difference in cost between the two systems is	$700.00
Maintenance per year for 300 telephone sets at $1 per year is	300.00
Average difference in cost between 300 central battery and magneto telephone sets at $1 is	300.00

As a rule there are two conditions confronting the telephone man. The one is when the equipment starts off as a complete central battery exchange. The other is when there is a magneto switchboard and it is wished to change to central battery. With the first condition the central battery exchange will more than pay the difference in cost in about a year and a half. This is shown by taking the difference in first cost of the switchboard and the telephone sets as $400, and subtracting from this the difference in maintenance charges for the first year, and we have $100 left, which will be easily taken care of the first half of the second year by saving in maintenance. With the second condition, if it is wished to use the old telephone sets temporarily, this can be done by placing in each telephone set one 2-mf condenser in series with the bell. This will answer until central battery telephone sets can be installed. The magneto telephone sets can then be reused in other magneto exchanges or disposed of in some way. The saving with the second condition may not be as great as the first condition in the same length of time, as it will depend entirely on how advantageously the magneto telephone sets can be disposed of.

FACTORS DETERMINATING THE TYPE OF SYSTEM.

The selection of the proper type of system will in part be determined by the kind of service to be given. A telephone service is made up of different kinds of subscribers, which, as mentioned above, will be classed as city and rural subscribers. The rural lines running a short distance in the country are usually equipped as four-party lines, and the rural lines running a long distance in the country are equipped with a great many telephones bridged on to one line. Now, if the city telephone subscribers and the short rural party lines are together in the majority, then it is advantageous to use a central battery switchboard, and provision can be made on the switchboard for the long magneto rural lines. On the other hand, if the majority of service is derived from rural lines, with the city telephones in the minority, then there is no question that the magneto switchboard is the better proposition. Again, it may be possible that the character of the service will change. In this event, one should decide which class will be in the majority, which point will help determine the type of system.

One of the first things to be done in the laying out of a telephone plant, either for magneto or central battery, is to make a study of the town or community. This is known as a traffic study. This takes into account the present number of subscribers, the locality where the subscribers are the most numerous, the direction of growth of town, the present population, the estimated population in ten years, the class of people, this to be subdivided into users and non-users of telephones, and the condition of the surrounding country. The locality where the subscribers are most numerous is usually taken as a desirable place to locate the switchboard, as the line will be the shortest when radiating from one common point. This should also be taken into conjunction with the direction of growth of the town, for if the town should make abnormal strides in any one particular direction, then it might be well to have this in mind when deciding upon the location of the exchange. The number of telephones per one hundred people for the present population can be taken as a base for determining the number of telephones there will be in service in ten or twenty years, providing the growth is normal. This factor will determine the capacity of the switchboard.

A great deal depends upon the class of people, whether they are telephone users or not, and this is a very important item. They may not have developed the telephone habit, yet, under proper and careful tuition, they may be led to become users. Again, they may never acquire the habit, or they may not have reached that plane as yet, but they may develop it in the next ten years. All these points will enter and become a factor in making your study of the people. The country surrounding a telephone exchange very often becomes the determining factor in deciding upon the system to be adopted. If it has a large rural population, and the town is small, then the chances are that there will be more long rural lines than city lines, so you can readily see that it is necessary to take into account a great many factors in deciding upon the system from the estimated growth of the town.

Before considering a central battery switchboard the outside lines must be in good condition. That is, it is not conducive to good service to have the lines rubbing against the trees and foliage, as they cause noisy lines, and during wet spells cause the line lamps to burn in the central office, giving a false notice to the operator, thereby impending service. Therefore the outside construction should have metallic lines, well insulated and free from all foreign interference. It is possible to work a grounded line on a common battery system, but it is apt to be noisy if it is near high tension or trolley lines, as they have a tendency to make the telephone lines noisy. It is well, then, to have the outside construction in mind when building new lines, and to use the very best material and construction that can be obtained, as these two items will save an immense lot of trouble in the future.

From a service point of view, the condition of the switchboard and telephones should be considered. If the switchboard is in fair condition, then it might be possible to continue its use for some time. This, of course, would depend upon conditions. That is, it might not be good policy to remove the switchboard just because central battery was better. At least, not until its period of usefulness was gone, and a location or a customer could be found for it. Again, it might be policy to keep the old board in service until the outside lines could be put in shape, providing they are not in proper condition for central battery work. With the ordinary magneto telephone set, it is an easy matter to convert it to central battery. This is done automatically by placing a condenser of 2-mf capacity in series with the bell. This scheme will work satisfactorily until central battery telephone sets can be installed.

In a great many cases after a magneto switchboard has passed its years of usefulness at one exchange, it can,

after being removed, be repaired and put in fair condition, at least good enough to serve as a pioneer in another locality, or a purchaser can be found who, perhaps, is in the kindergarten class as regards a telephone exchange, and would jump at this chance to buy a second-hand switchboard in fair conditions. This same thing can be applied to the telephone sets.

Before considering any undertaking the financial question should always be considered, and this rule will fit most anywhere, particularly in the telephone business. The financial condition of a telephone company may be such that all the money that can be raised may be just enough to permit it to buy a magneto equipment, and it does not care to spend any more in order to purchase the central battery system. In this case there is no question as to which system to buy, as the financial question decides the case; but the purchaser should weigh all sides of the question very carefully, and not be governed by one condition alone, to the detriment of service and future dividends. This can be applied to magneto as well as the central battery system.

In order to operate a central battery switchboard satisfactorily, it is desirable to have an outside source of current for charging the storage batteries, which, in turn, supplies current to the operator's sets, the telephone sets, the line lamp signals and the relays. If the exchange is small enough, current may be obtained from dry cells. If storage batteries are used, the batteries can be charged by means of a motor generator charging set, mercury arc rectifier, or simply through resistance or a bank of incandescent lamps. If an outside source of power is not available, and the equipment is too large for operation from dry cells, it may be necessary to install a gas engine in order to operate a charging generator.

CONVERTIBLE SWITCHBOARD.

We have shown how every telephone system, as it grows from a small to a large one, must some day change from the magneto to the central battery method of operation. Although we have shown that central battery operation would be more economical under certain conditions, yet when the proper times arrives to make this change, many telephone companies will find it impossible to make a complete change from magneto to central battery on account of financial reasons.

Heretofore, if a telephone company could not raise the necessary capital to purchase the new central battery switchboard, the new power plant equipment and the new telephone sets, or for remodeling the old telephone set, if practicable, it has been necessary for such a company to continue to give the more costly magneto service. A telephone company that is in this predicament has a hard problem to solve, and furthermore that problem becomes all the more difficult as the number of lines increase, for they will be obliged to purchase a still larger number of magneto telephone sets and a greater quantity of switchboard apparatus, which must be taken into consideration at the time of the inevitable change.

It was with this point primarily in view that "convertible" switchboards were introduced. These switchboards are so designed that they can be used originally for magneto service, and can be converted at will for central battery operation.

By adopting this type of switchboard the telephone company will find it a comparatively easy matter to finance a "stepping-stone" change to pass them over from the inevitable small magneto exchange to the inevitable large central battery exchange. By this means all of the expense of the purchase of a new switchboard will come at a time when no additional expense will be absolutely necessary. The purchase of the central battery telephones can be made to come at various times as the number of central battery subscribers increase. If at the time of the change the number of subscribers is sufficiently small, the expense of a power plant, with its charging outfit and storage battery, can be avoided by the use of dry cells.

There are other conditions under which the convertible type of switchboard is desirable. In fact, with some telephone companies, perhaps this would be the strongest reason for adopting such a type of switchboard. The reason is as follows: There are many telephone companies that are having a hard time to show any earnings on account of their rates being too low. These rates are fixed by a franchise, and it is impossible to change the rates until the franchise runs out and a new one is granted. In accordance with the terms of most franchises, there is nothing to prevent the telephone company securing a higher rate if the subscriber is willing to pay it. In small telephone communities, where the exchange is on a magneto basis, a considerable number of subscribers will be found who will be willing to pay about fifty cents a month more if the telephone company can give to them central battery service.

This is true for several reasons: 1. As mentioned above, the central battery telephones are quicker to operate. This would appeal strongly to all business and professional men. 2. A better grade of service can be given with central battery telephones, since they avoid all "hang-up" difficulties. Furthermore, a better grade of long distance transmission can be secured. 3. A central battery telephone set is more compact, and it therefor appeals to a certain class of people as a superior residence set. 4. It is human nature for some people to want the best, and if central battery telephone sets are available they will demand them.

Since with the use of this convertible type of board it is possible to convert any one subscriber's line at a time, it is thus possible to furnish the central battery service to any subscriber at such times as he desires to pay the increased rate for this better class of service. On account of the fact that this convertible type of switchboard adapts itself so well to this purpose, it has been called by some the "rate raiser." In view of the many advantages found in this convertible type of switchboard, it is safe to say that it will take a permanent place in the field of telephony.

SUMMARY.

From what has been said above, it is evident that the type of system that should be recommended for exchanges of from 250 to 500 lines is dependent upon the actual conditions existing in connection with any one plant. After knowing the conditions that obtain at such plants it will be a comparatively easy matter, by following the plant outlined above, to determine the proper type of system. That is, whether magneto, convertible or central battery. Under average conditions, and with equipments of about 300 lines or over, convertible or central battery systems will give the better return on the investment.

In closing this paper I wish further to point out the fact that a telephone company can make a more serious mistake by continuing to operate on a magneto system long after the changing point has been reached, than by changing to central battery at too early a date. With the former case, the longer the delay in changing from

magneto to central battery, the greater will be the financial burden in making this change; or, in other words, the situation is gradually becoming worse. With the latter case, if the change was made at too early a date, it is simply anticipating the ultimate condition that must obtain. Or, in other words, the situation is gradually righting itself.

The present arrangement of these switchboards is such that the supervisory signal of the cord circuit can be operated both on a central battery connection or a magneto connection, or a combination of both. These switchboards are generally equipped with universal cord circuits, by means of which it is possible for the operator to connect magneto to magneto, magneto to central battery and central battery to central battery subscribers. With such cord circuits it is unnecessary for the operator to know whether the two lines that desire to be connected together are magneto or central battery. The operator is simply required to plug into the jack, and the cord circuit will automatically adapt itself to the magneto or central battery condition, as required.

Particular attention is called to the fact that after such a switchboard is converted to part magneto and part central battery, all of the apparatus originally furnished with the switchboard is retained and the apparatus performs the same functions under the new conditions. As a rule, in every telephone system there will be required some magneto lines, either of the bridging rural type or of the roll type, thus, after all of the city lines have been converted to central battery, there will still be a demand for a certain number of universal cord circuits. After the conversion has taken place the new city lines that will be added from time to time will all be on a central battery basis, and the additional sections of switchboard that may ultimately be required to contain such lines will be of the straight central battery type—that is, the line circuit apparatus will not be wired for conversion, and straight central battery type of cord circuits will be substituted for the universal type.

Missouri Independents in Convention

The annual convention of the Missouri Independent Telephone Association was held in St. Joseph, Mo., May 3, 4 and 5. The morning of the third was devoted to the executive committee meeting, after which the convention was formally opened by Dr. S. T. Neill, president of the association, followed by an address of welcome by Mayor Clayton. After a short speech by Ex-Mayor W. E. Spratt and the report of the secretary-treasurer of the association, H. C. Todd, who was accorded a vote of thanks for the efficient manner in which he had performed the duties of his office, an adjournment was had in order to give the members an opportunity to view the various exhibits of equipment and supplies. The evening was spent by the members as guests of the St. Joseph Home Telephone Company at the Lyceum theater.

Wednesday morning's session opened with a paper by Houck McHenry, Jefferson City, entitled "A Study in Depreciation," in which was emphasized the necessity of providing an ample depreciation fund. This was followed by a discussion led by W. C. Polk, consulting engineer, Toledo, Ohio, in which Mr. Polk brought out the distinction between maintenance and depreciation. He classed maintenance under two heads: maintenance of property or plant and maintenance of operation. Under the first class he placed the restoration of a plant which has suffered from an emergency such as a sleet storm; in the second class he placed the replacing of old worn-out material. A fund of twenty per cent, at least, was advocated as a proper amount to set aside for this purpose.

"Valuation of Telephone Properties," also by Mr. Polk, brought out considerable discussion which showed difference of opinion, some claiming that none of the telephone systems in the state were assessed too high while the majority, of course, held the opposite opinion.

A. J. Shands, St. Louis, presented a paper on "Recovery on Lost and Cancelled Calls," advocating the following-up of calls which have been ordered canceled by the calling party because the party called had not been in at the time the call was made, or for various other reasons, as a means of showing the disposition of the company properly to serve its patrons. This paper was followed by a talk by J. B. Ware, secretary-treasurer of the National association, in which he made comparison between the rates of the independent and Bell companies in the state of Michigan, and also set forth the benefits to be derived from a membership in the National association.

The main feature of the convention, of course, was the address of the president of the National association, F. H. Woods, Lincoln, Neb. Mr. Woods spoke very highly of the telephone activities of Missouri, stating it was probably the leading telephone state in the Union, and while hailing from a state which has no mean position in the telephone field, he acknowledged that in some respects Missouri was ahead.

He urged upon the association the importance of all the states working in harmony as their interests were common and they all had the same question confronting them, namely, that of maintaining competition in the telephone business, and that of leading the public to appreciate the benefits to be derived from competition. As a means to this end he advised that an article be drawn up showing the advantages that have been derived from actual competition; what it means in a financial way, laying special stress upon the kind of competition the Bell people have been giving and the efforts that have been put forth along this line by the independents, sending a copy of the article to every telephone user in the city, the members of the legislature and the United States representatives in congress and to see that they appear in every newspaper in the state.

Election of officers placed George W. Schweer, Windsor, in the president's chair, and H. C. Todd was re-elected secretary-treasurer.

During the course of the convention a resolution was passed advocating federal supervision over interstate telephone and telegraph companies, similar to the resolution passed by the Kansas association, and given in connection with the report of that body on another page.

New Omaha-Denver Line

Announcement is made by the Nebraska Telephone Company that the American Telephone and Telegraph Company will build a new long-distance line between Omaha and Denver, thus affording direct communication between Denver and Chicago and improving the Denver-Omaha service.

The present Denver-Omaha service is via Kansas City and is not of the desired standard of efficiency.

This new line will be in operation this year. It will be of heavy copper.

Developments of Wireless Telephony

By William Dubilier

A SWEEPING plan for the extension of the wireless service for the United States Navy has been submitted to congress by Rear Admiral Cowles, chief of the bureau of equipment, in which he advocates that wireless apparatus of the latest type be supplied to all the new vessels of the navy, including destroyers and all auxiliaries.

Wireless telephony will receive its share of consideration, as well as wireless telegraphy, and the condition required is a system which will be operative over distances of 100 miles, and to remain in adjustment for five minutes at a time. The Collins system will be one of those competing, and as the result of recent tests it is evident that it should easily fulfill the requirements cited. The apparatus will be the duplicate of that shown at the recent Alaska-Yukon-Pacific Exposition at Seattle, and described in this article, the illustration showing all apparatus named.

The transmitting apparatus, in its entirety, includes a Collins revolving oscillation arc lamp, a high frequency and high potential variable tuning inductance transformer and the usual revolving variable condenser. These separate devices are designed to withstand potential strains of upwards of 5,000 volts.

A. Frederick Collins and his Wireless Telephone.

The initial current is 500 volts direct current, and this is increased to 5,000 volts by a direct connected motor generator set. The latter high voltage current is used to energize the revolving oscillation arc lamp, which is an improvement on those previously employed. The lamp proper consists of a pair of hard carbon disk electrodes, and these are mounted on parallel spindles, so that they are in the same plane and are connected by means of bevel gears secured to an insulated shaft. The disks are insulated from each other by mica bushings fitted in the gearing, the casing forming one of the connections, while the insulated bearing in the bottom of the casing forms the other.

The gearing is so arranged that the disk electrodes are rotated in opposite directions, the power being furnished by a small motor. One of the bearings of the shaft is mounted in a keyed sleeve, which permits the spindle carrying one of the carbon disks to be moved toward or away from the opposite disk, so that the length of the arc may be varied while the lamp is in operation. The carbon electrodes are placed in a metal casing, while the rotating mechanism is attached to the bottom of the casing. The casing is supported between the poles of an electro-magnet, and through the ends of the poles and at right angles to them are polar projections of soft iron, which are threaded, and these are screwed through the extremities of the magnet and at right angles to the arc, thus permitting the magnetic field to be varied within wide limits. The coil of the magnet is used as a portion of the primary circuit of the transmitter, serving the purpose of choke coils, and so preventing the oscillations from backing up into the high tension, direct current generator.

The rotating oscillation arc obviates the disadvantageous features of the stationary arc, in that a constantly fresh and cool surface is presented to the arc; in that it prevents the uneven burning away of the electrodes, which gives rise to untoward variations in the frequency of the oscillations, and thereby throws the circuits out of resonance; and in that the optimum length of the arc, namely, the length at which the resistance of the arc is best proportioned to the capacity and inductance of the closed circuit, is maintained; and finally in that a constant arc may be maintained for very much longer periods of time than is possible where the carbons are stationary.

The chief improvement in the combination tuning inductance transformer is that a new and novel means of contact is introduced, whereby any variation of the inductance can be had, and in tuning a wireless telephone transmitter this is vitally necessary. The contact is made by a ring provided with three small grooved pulleys, which press against the turns of the tuning coil forming the primary.

Having a spiral form, this coil causes the ring, when it is rotated, to travel back and forth from end to end. A small track under the coil serves to guide a carriage, which, in turn, makes contact with the ring. With this arrangement the inductance can be varied, thus making it easy to put the closed oscillat-

ing circuit in resonance with the open radiating circuit. The secondary is arranged to slide in or out of the primary, making a loose coupling, which is another essential in the production of high frequency undamped oscillation. The adjustable tuning auto-transformer is designed to be used in the serial wire circuit and more or less inductance can be had by turning the wheel causing the contact spring to travel back and forth. The variable condenser consists of a number of semi-circular fixed plates of metal built up in a cylinder of insulating oil, while a second series of movable plates is secured to a spindle meshed with the first set, but is insulated from it. A handle attached to the cord permits any variation of capacity within the limits of the condenser to be obtained. A scale divided into thousandths and ten-thousandths of a microfared and a pointer indicates the value of capacity at any point.

The receptor comprises a thermo-electric detector of Mr. Collins' invention, the fuller details of which cannot be given out at the present time. It is said, however, that this detector is sensitive to oscillation of 1-5,000 of an erg and is especially well adapted for the relaying of speech oscillations. A variable electrolytic potentiometer is used to control the source of current, while the tuning inductance and condenser are very much the same as those employed in other systems.

At the Alaska-Yukon-Pacific Exposition the Collins wireless telephone received the highest award, the gold medal, conferred by the official electrical jury, composed of Prof. F. E. Johnston of Washington University, Captain F. P. Turner of the United States Army Signaling Corps, and Mr. Leopold Stocker, electrical engineer.

A number of wireless companies have recently consolidated under the name of the Continental Wireless Telephone and Telegraph Company. The corporation organized under the laws of New York, with a capital of $5,000,000.

The plans of the consolidated companies contemplate transcontinental commercial business, as well as the continuance of the marine reports and shipping messages which have up to this time constituted the greater portion of wireless endeavors. The new company will enter into competition with the old wire telegraph companies for commercial and public patronage.

The companies forming the consolidation are the Massie Wireless Telegraph Company, Clark Wireless Telephone and Telegraph Company, Pacific Wireless Telegraph Company, and the Collins company of Newark, N. J.

The officers of the new company are: President, F. T. Davis, Philadelphia; vice-president, Walter W. Massie, New York; general manager, Thomas E. Clark, Detroit, Mich.; technical director, A. Frederick Collins, Newark, N. J. Headquarters will be in New York.

The New London-Paris Telephone Cable

It may be well to state that most of the reports in the daily press as to the results to be obtained with the new telephone cable laid across the Channel are very misleading, says the *Electrician*, of London. This cable has not been put down with the object of improving telephonic communication between London and Paris, but as an experiment to test the capabilities of Pupin coils under practical conditions. It is true that the normal increase in the number of telephone messages between the two countries would necessitate, sooner or later, an increase in the number of cables across the Channel, but the main object of the Post Office was to put a loaded cable to a practical test. The question of reducing attenuation in submarine cables is of particular importance to the Post Office at the present time, since it is wished, if possible, to obtain direct telephonic communication between London and Germany without the cables touching French or other territory. The success of the present experimental cable would, therefore, undoubtedly lead to important developments, and it may be mentioned that the French administration intends to lay down a similar cable at an early date.

Considerable misunderstanding also appears to exist as regards the results to be obtained with the "loaded" cable, it being stated that communication will, in future, be possible even between the Midlands and Paris. As a matter of fact, however, at the present time one can speak from Liverpool, Manchester, Leeds or Hull to Paris, and from the Midlands through to Lyons, and under favorable conditions, even from Leeds to Lyons. When the new cable is in operation the total distance over which speech will be possible will be increased by about one hundred miles. In this connection it may be mentioned that by the addition of the Pupin coils the equivalent length of the new cable between Dover and Cape Grisnez has been reduced from 10.5 miles to 3.4 miles of standard cable. This is a saving of 7.1 miles of standard cable, which saving represents about 140 miles of heavy aerial telephone line, or seventy miles of ordinary telephone line, these representing, therefore, the additional distances over which telephonic communication will be possible. It must not be forgotten that the "threefold" improvement due to loading affects only the submarine section of the line, although some of the accounts in the daily press would imply that the limiting distance of telephonic speech will be increased in this ratio.

Rockets for Cable Laying

A rather novel method was recently employed by repairmen in their efforts to get a wire across the Connecticut river, about seven hundred feet, after the burning of a wooden bridge between Westminster, Vt., and Walpole, N. H. The toll and local circuits had been placed on the bridge and it was essential that service be restored as soon as possible. Men and materials were rushed to the scene and an effort was made to get wire across in a boat, but the current of the river at this point was so swift as to make this impossible as the boat was almost capsized. Skyrockets were ordered by District Plant Chief Durfee. Wire Chief Wright shot one across the river and by means of a string attached to the rocket a hand line and temporary cable was drawn across, after the second attempt, the cable breaking the first time and catching fire from the ruins of the bridge.

The United States House of Representatives has declared, through an amendment to the Administration railway bill, that telephone and telegraph companies are common carriers and as such are subject to control of the Federal government.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

WHEN you are born to the purple and don't have the maintaining emoluments bequeathed to you, there is only one thing to do—demand the coin. If it is decreed by Fate, or Fate's second cousin, that you must have at least a thousand a month for the fixed and incidental expenses that hover around pay-day, due largely to your own and other causes, but always due, regardless, you are a lucky child if you fall into something that produces the kale.

Independent telephony is responsible for a lot of serious and frivolous things. It graciously acknowledges them. It falls for our college chum Mack. It likes Mack and Mack likes it. They are necessary to each other, brought up in the same nursery and on the same bottle. Mack is the all-round jollier for Independent telephony with a cap I. Of course, you know him. He is always there—the auburn-crowned wonder of the business.

PHOTO BY HOWE, 1910

The Auburn-Crowned Wonder of the Business.

Merlan Chadmer Barry, or rather Harry Bernard McMeal—all the same by the little old rule of cancellation and transposition—is a telephone engineer without prefixes or suffixes. He is more than that, for he gets the money. He has to, for he needs it in his scheme of living. Mack is pink-skinned, soft-palmed, well groomed. As a mixer, he will give you all the cards, stand pat on a deuce, pay the check and beat you out. As a salesman of white space at so much per square inch, he hasn't an equal. Mack started *Telephony* on a shoe string, or even less. In the winter of 1900 he borrowed a pencil and with a dummy, furnished by a paper house, embarked upon his publishing career. The first issue of *Telephony* carried twenty-five pages of advertising at $30 per page. It had a circulation of umty-um-umty—which means sufficient for past purposes. Fifteen months later he was offered $30,000 for his property, but he saw a sure income of $1,000 a month, and he held for it. He still holds—holds control of a business that is worth $100,000 of any man's money—the best milked institution that ever gave down.

Harry McMeal takes pride in his ability as a bughouse financier. Anything that falls into his hands with the suspicion of a dollar mark upon it is converted. As a converter he has any Methodist deacon ambushed. Dollar signs suggest money and money is something to be circulated. Mack is a spender—not a hoarder; a bond-vendor, not a coupon-clipper. He is a clipper, all right, but not that kind.

H. B. went the full distance to meet Old Man Opportunity. He sticks around the stoop of his benefactor and is kind to him. When he wants to endear himself to the old man, he adopts a reckless, don't-care-a-continental manner of expression, but he never got pinched for it. A man with a big round countenance and a big round roll in his hand can get away with the extraordinary pleasantries. As the town cut-up, he can cut up the silk bunting and drag it around the corridor, because he has the drag. Easiest thing you know.

Mack is an anti-Bell crusader. The shield of the Independents was his crowning triumph. He needed a shield—something to get behind and push, or push behind and get—it's as broad as it is long. The crusaders used the shield and, being a crusader himself, he adopted it as another of Old Man Opportunity's cherished bequests. But seriously, McMeal has earned his pension. To be sure, a thousand a month is a lot of spending money for one man, but the Independents are lavish with their favorite sons. Mack saw it first, the original was thought out under that big dome and behind those big wind shields, and no one could show more appreciation or let it slide back into circulation so gracefully. For Harry B. McMeal circulates his'n. It is his long suit, and he shares the fun of it with his friends, who are classified and classy.

Fat and forty is his age. He used to be in the coal business at Pittsburg, where a miner's strike got his goat. Came from the south, where the smooth manners grow along the roadside with the rhododendrons. Suave, slick and splendiferous—the thousand a month thinker who has earned the diamond belt as a worker of Independent telephony for Independent telephony, first, and never-to-be-forgotten Mack, himself, running a close second.

He hasn't a single hobby—no time for it. Tries everything at least once. Takes a crack at some things more than once. Likes the games where the sitting is good and lots of it—all the way from the grandstand to draw. Was elaborately and expensively trained in his youth for the clergy, but found selling more to his liking than saving.

Why, of course you know Mack!

The Kansas Independent Convention

The annual convention of the Kansas Independent Telephone Association has passed into history leaving its participants with the strong belief that if they work diligently during the present year, along the lines mapped out in the sessions, they will not only have the hearty co-operation of the public, which is so essential, but will be able to place the telephone business of the state on a more substantial financial basis than ever before.

The convention was extended a cordial welcome by E. W. Rankin of the Topeka Ad Club, after which the position and needs of the independent interests were earnestly set forth by W. P. Hemphill of Topeka, president of the association. Mr. Hemphill dwelt at some length upon the purpose of the association, which is to promote the interest of its members through the exchange of ideas regarding management, the handling of equipment and all the various details which go to make an ideal telephone system, and to encourage and foster a fraternal and co-operative policy of operation. These relations have created in the minds of those engaged in the business a sense of obligation one to the other and have stimulated confidence, the lack of which Mr. Hemphill regards as one of the greatest barriers which confronts the independent telephone investor. On this point he says, "The greatest objection that is ever raised by the investor to our business is the fear that some neighboring telephone man in a close-by town will disregard his obligations and sell his property to our competitor so that we lose his connections. Stop and consider for a moment—is not the breaking of our connections about the only serious thing independent operators have to fear?"

He reminded his hearers that the public appreciates the benefits of competition, and urged upon them the necessity of looking with disfavor on anything that threatens it, and at the same time impressed on them that it is only due to the fact that they have been able to make good that the public offers the greater share of its business. At this point an earnest plea is made for the plan of organization which has been worked out by thoughtful men and which it is claimed will stand the legal test. The plan is based on a membership contract to run for a number of years, in which the applicant pledges that his property will remain a part of the National Independent telephone system of the United States for a number of years, but does not prevent him from selling the property to whomsoever he pleases. It is believed by its advocates that this plan if carried out will insure such protection as to induce much capital to enter the independent field that has heretofore held itself aloof for lack of this assured protection. The fact that the telephone business owes its very existence to the absolute needs of commercial and social life is given as assurance of its perpetuation and this inherent quality is urged as one reason why, under proper management, it should be able to lay claim to financial support from those who have means to invest and should render a safe return.

The lack of knowledge of the business is regarded as being responsible for many failures and not the business itself, the speaker claiming that no well managed, honestly financed independent telephone company ever failed, or has ever lacked for patronage. Presenting as it does so many details, he who would succeed must learn the business to the minutest detail.

The lawmakers were urged, if necessary, to pass such laws as will protect the citizens of the state in legitimate competition and will require like pay for like service, on the ground that if free passes are wrong for the railroads free telephone service is also wrong and liable to be corrupting. Free service and cut rates are placed in the same category.

In closing, the speaker made the point that two things are essential to supremacy in the telephone field, namely, service and development, and while no one qustions the value of good service, not everyone realizes the importance of development. Both are demanded by the public, and every effort should be made to meet this demand.

Election of officers resulted in returning W. P. Hemphill to the presidency, while A. B. Clarke was re-elected secretary.

An important action of the convention was the passing of a resolution urging federal supervision over interstate telephone and telegraph companies. The resolution reads as follows:

"*Whereas*, In view of the fact that in none of the laws defining the powers and duties of the Interstate Commerce Commission is there any provision giving that body regulatory powers over telephone companies, and

"*Whereas*, There is now in process of formation a gigantic trust, headed by the American Telephone & Telegraph Company, having for its object the establishment of a monopoly in the business of furnishing means of quick communication between the various sections and persons of the United States and the crushing out of competition, through the purchase of competing plants, in defiance of law and through the exercise of the vicious power it now possesses of giving service below cost where competition is strong, and recouping itself by exacting extortionate rates at points where those conditions do not exist, and

"*Whereas*, Public policy and private interest demand the maintenance of effective competition, as a protection against monopolistic conditions, excessive rates and inadequate service, therefore, be it

"*Resolved*, By the Missouri Independent Telephone Association, in Convention assembled, that it petition Congress that the bills now pending before it, in which it is sought to enlarge the powers of the Interstate Commerce Commission, be amended so as to empower that commission to establish and regulate the rates and service of interstate telephone companies; to exercise such regulatory power as shall prevent discrimination between persons and communities; and, by equalizing charges and rates shall make competition free and open, as between the cities of the several states."

Telephone Employment Statistics

Statistics recently compiled at Washington show that 92 per cent of the employes of telephone companies are unmarried, 5 per cent married, and 3 per cent widows. Seventy-one per cent are between the ages of 16 and 24, 22 per cent between 25 and 35, and only 7 per cent above the age of 35. It is stated that only one-fifth of the employes of telephone companies in New York are required to work overtime. The average monthly wage for this class of workers in New York is $39.96. The investigation covered twenty-seven telephone companies operating in twenty-six states, including both Bell and independent. There are 25,298 salaried employes, 3,786 male, and 76,638 female, the average wage of the latter being $301.31 per year. The report, which is made to the Bureau of Labor, covers practically every phase of telephone operation except the ownership of stock control.

According to official returns, during the year ending March last the loss on the British postoffice telegraphs amounted to $2,834,582, the surplus on telephones to $1,327,348, including a surplus on trunk calls of $279,160. These amounts do not take into consideration capital account charges.

Items of Legal Interest

By Ralph M. Loring

EXCLUSIVE CONNECTION.

REV. St. 1899, sec. 1255 (Ann. St. 1906, p. 1029), requires every telephone company, incorporated or unincorporated, to receive dispatches from and for other telephone lines or individuals, and, on tender of their usual charges, to transmit promptly, impartially, and in good faith, under a penalty. Section 1256 provides that, where a sender desires to have the dispatch forwarded over the lines of other companies whose termini are, respectively, within the limits of the usual delivery of such companies, to the place of final destination, and tenders the amount of the usual charges for delivery to the final destination, the receiving company shall pay to the succeeding line the necessary charges for the remaining distance, and the latter shall accept the same and forward the message in the same manner as if the sender had applied to it. Section 1254 authorizes any telephone company to join with any other corporation in constructing, leasing, owning, using, or maintaining their lines upon terms to be agreed upon. Plaintiff and defendant telephone companies executed a contract, by which each granted a license to the other to connect with their respective exchanges, and each agreed to transmit all messages destined to points on the lines of the other not reached by its own wires over the lines of the other party, and further agreed not to enter into any contract with any other person or corporation whereby any of the rights or advantages therein acquired by either party might be impaired. *Held*, in view of the public necessity which is impressed upon either an incorporated or unincorporated telephone business, that both at common law and under the statute, a telephone company must impartially furnish equal facilities to all for communication over its lines, and, if it voluntarily gives facilities to one company by permitting connection with its exchange, it must grant like facilities to all other companies of the same class, though they may be competitors, and the contract was void for granting an exclusive right of physical connection with the respective exchanges of the parties thereto; section 1254 only permitting telephone companies to join in using their lines in a manner not in violation of the other sections. *Home Telephone Co. v. Granby & Neosho Telephone Co. St. Louis Court of Appeals, Missouri.* 126 *Southwestern* 773.

LIABILITY OF HOUSE MOVER.

A telephone company had the franchise right to lay conduits under a street. A house mover, under permit of the city to move a house, consulted the telephone company about lifting and cutting overhead wires, and telephone men went over the route. The company gave a receipt to the mover, reciting the receipt of $75 to cover expenses of "changing the wires or other property" of the company. The mover damaged the conduits by driving a stake into the ground. *Held*, that the receipt and oral negotiations, being confined to overhead wires, did not affect the liability of the mover as for an unlawful trespass in damaging the conduits. *Frontier Telephone Co. v. Hepp. Supreme Court of New York.* 121 *N. Y. Supp.* 460.

GUY WIRE NOT PROXIMATE CAUSE OF INJURY.

Where a plaintiff, who was injured by coming in contact with a telephone guy wire, maintained on the parkway in a street between the sidewalk and the curb, as she was crossing the street, alleged negligence in the telephone company in maintaining this small wire so near the ground with no guard, so that it would not be seen in the nighttime, her testimony that it was so dark that she could not see a telephone pole two feet away showed that the fact of the wire being small was not the proximate cause of her injury, as she could not have seen it under any condition, and bars her recovery. *Bentley* v. *Missouri & Kansas Telephone Co. Kansas City Court of Appeals, Missouri.* 125 *Southwestern* 533.

NEGLIGENCE.

In an action against a telephone company and a lighting company for injuries to an employe of a city, which had wires strung on the telephone company's pole, by a connection between the telephone company's grounded cable seat and a defectively insulated wire of the lighting company attached to the telephone pole, whether the telephone company was negligent in attaching its cable to the cable seat with a wire, so as to ground the cable seat and permit injuries to persons coming in contact with it and the lighting wire, *held* for the jury. *Beaming* v. *South Bend Electric Co. Appellate Court of Indiana.* 90 *Northeastern* 786.

CONTRIBUTORY NEGLIGENCE.

In an action against a telephone company and a lighting company for injuries to an employe of a city, which had wires strung on the telephone company's pole, by the making of a connection between the telephone company's grounded cable seat and a defectively insulated wire of the lighting company, attached to the telephone pole, whether plaintiff was negligent in ascending the pole on the wrong side, and not observing that the cable seat was attached by a wire, *held* for the jury. *Beaming* v. *South Bend Electric Co. Appellate Court of Indiana.* 90 *Northeastern* 786.

DAMAGES FOR INJURY.

A verdict for $3,500 for personal injuries from contact with a live telephone wire is not excessive where the plaintiff was burned to the bone on the back of his head, had burns on his hands, several burns on the sole of one of his feet, which at the time of the action caused him pain when walking any distance, and the arch of one foot had permanently broken down, and his ability to earn a livelihood was much impaired. *Dow* v. *Sunset Telephone & Telegraph Co. Supreme Court of California.* 106 *Pacific* 587.

TELEPHONE COMPANIES IN INDIAN TERRITORY.

Telephone companies doing business in the Indian Territory prior to statehood obtained their authority to construct their lines along and over the streets and public ways of the incorporated cities and towns therein by virtue of section 3 of the act of Congress approved March 3, 1901 (Act March 3, 1901, c. 832, 31 Stat. 1083), and the rules and regulations of the Secretary of the Interior promulgated thereunder. *South McAlester-Eufaula Telephone Co.* v. *State ex rel Baker-Reidt Mercantile Co. Supreme Court of Oklahoma.* 106 *Pacific* 962.

CONTRACT BETWEEN TELEPHONE COMPANIES.

In this case a contract between a local telephone company and a long distance telephone company relating to the transmission of messages by each one over the lines of the other is interpreted, and it is *held* that the local company has the right to forward over the long distance line messages originating at a certain city with which the local company had no connection when the contract was made—*Kansas City Long Distance Telephone Co. v. Paola Telephone Co. Supreme Court of Kansas.* 106 *Pacific* 290.

TRESPASSERS.

A telephone company in possesion of a vacant lot as a license, while constructing a telephone line across it by means of an appliance consisting of pulleys and a rope strung along the top of the poles and down along the side of the poles to the ground, owes no duty to children trespassing thereon, except not to injure them wantonly; the contrivance not being a dangerous one calculated to attract children. *Hall* v. *Missouri & Kansas Telephone Co. Kansas City Court of Appeals, Missouri.* 124 *Southwestern* 557.

INJURY OF LINEMAN.

Where an experienced telephone lineman and trouble man, whose duty it was to discover and remedy defects in the line, and who had charge of the operating department, was injured by a fall from a telephone pole which he was climbing in the daytime by his foot slipping from a bent iron step on the side of the pole, his failure to notice the bent step was negligence proximately causing his accident, and he cannot recover. *Goddard v. Interstate Telephone Co., Ltd. Supreme Court of Washington.* 106 *Pacific* 188.

INSPECTION OF POLE BELOW GROUND.

A lineman, employed by a telephone company to remove poles because a new system rendered them unnecessary, could assume before climbing a pole that the company had inspected the poles beneath the surface of the ground, unless the duty of inspection devolved on him either by his contract or by the company's method of conducting its business to his knowledge. *La Duke v. Hudson River Telephone Co. Supreme Court of New York.* 120 *N. Y. Supp.* 171.

DEFECTS IN POLES.

Defendant electric company, owning a cross-arm on a pole was not liable for injuries to a lineman in the employ of another company caused by the breaking of the cross-arm, where the cross-arm was not defective when originally placed in position, and defendant had no knowledge of the defect. *Maryland Telephone Co.* v. *Chambers. Court of Appeals of Maryland.* 75 *Atlantic* 241.

ASSUMPTION OF RISK.

Where an experienced lineman working for a telephone company, whose rules required linemen to inspect poles before climbing them, knew that there had been no inspection of a pole on which he had a right to rely, he assumed the risk of injury from its falling when he had climbed it. *De Frates* v. *Central Union Telephone Co. Supreme Court of Illinois.* 90 *Northeastern* 719.

INJURY FROM LIVE WIRE.

Where a telephone wire is placed dangerously close to an electric light wire, the continued maintenance of the wires in this position is negligence on the part of both companies, though the telephone wire was the last one placed in position. *Dow* v. *Sunset Telephone & Telegraph Co. Supreme Court of California.* 106 *Pacific* 587.

SAFE PLACE TO WORK.

A telephone company, employing a lineman to remove poles because a new system rendered them unnecessary, must inspect the poles below the surface of the ground, in furtherance of its duty to furnish a safe place to work, unless the duty of inspection is on the lineman. *La Duke v. Hudson River Telephone Co. Supreme oCurt of New York.* 120 *N. Y. Supp.* 171.

DAMAGES TO ABUTTING PROPERTY.

A foreign telephone company is not exempt from payment of damages to abutting property by construction of its lines in a street under a permit from the state and a city. *Southwestern Telegraph & Telephone Co.* v. *Smithdeal. Supreme Court of Texas.* 124 *Southwestern* 627.

ACCEPTING MESSAGE BY TELEPHONE.

A telegraph company, after accepting a message by telephone, cannot claim that the conditions in its printed forms are applicable, where it is accustomed to receive messages in that way. *Gore* v. *Western Union Telegraph Co. Court of Civil Appeals of Texas.* 124 *Southwestern* 977.

OBSTRUCTION IN STREET.

A telegraph company, leaving for many years in a street the sawed-off stump of a telegraph pole three feet high, is negligent, and is liable for injury to a pedestrian stumbling over it, unless he is guilty of contributory negligence. *Dobbins v. Western Union Telegraph Co. Supreme Court of Alabama.* 50 *Southern* 919.

DUTY TO INSPECT POLES.

It is not the duty of a telephone company to inspect its poles below the ground and inform its linemen which are safe and which are unsafe to climb. *De Frates* v. *Central Union Telephone Co. Supreme Court of Illinois.* 90 *Northeastern* 719.

A New System of Testing Cables

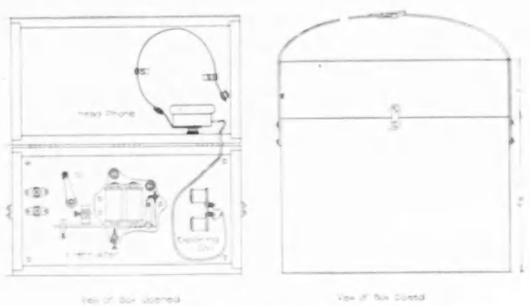
By H. Louis Hoffman

IT often happens that lightning will enter a cable in spite of the fact that the boxes have the best of protection. The lightning current sometimes travels several hundred feet through the cable and then arcs from one pair to another, or from a pair to the sheath, causing a low resistance cross to ground. In many cases this trouble will be scattered through several pairs located along a considerable length of the cable. With the Wheatstone bridge and the ordinary Murray or Varley loop test this trouble can be located only approximately. The cable then has to be opened and tested both ways. Sometimes it is necessary to open the cable at several places before the faults are found.

To obviate this difficulty and make the finding of the exact location of a fault a mathematical certainty, Mr. W. O. Pennell, engineer of the Missouri and Kansas Telephone Company, and myself devised a test set which has been named the "Telafault," and which is designed for locating faults in telephone and telegraph cables. By means of this set low resistance crosses, grounds and shorts can be readily located by the novice, the location being within the fraction of an inch of the trouble. The set may also be used on wet cables, but unless the cable is very wet, so that the resistance of the fault is low, more difficulty will be experienced in locating this particular kind of trouble. The special field for the Telafault is in the location of crosses, grounds and shorts, especially those due to lightning.

With the Telafault an interrupted current is placed on the line in trouble. An exploring coil (a part of the set) is wired to the terminals of the head telephone, which is worn by the tester. The exploring coil is then placed against the sheath of the cable and noise due to the induction from the interrupted current is heard. The coil is moved along the cable, and when the fault is reached, the noise will suddenly cease, the cable beyond the fault being quiet, while on the side of the fault toward the interrupter the noise will be heard.

The exploring coil furnished with the Telafault is so designed that by proper manipulation all return currents in the sheath of the cable tending to affect the positive and easy location of the fault are effect-



The Telefault.

ively neutralized. This feature is covered by broad basic patents. In all ordinary exploring coils the return current in the sheath in many cases causes an inductive noise, which results in a false location, or no location at all. When such coils are used the cable man sometimes overcomes this difficulty by removing the grounds and bonds from the cable, a practice which is never to be recommended. The Telafault is designed to obviate all of these troubles.

In many instances where the cables are small, 50-pair and under in size, it is possible to remove shorts and grounds due to lightning without opening the cable. The trouble is located by means of the coil and the cable is bent back and forth at the location of the trouble several times. If the trouble is in the nature of a small weld between two wires or one wire and the sheath due to lightning discharge, this bending movement will break the weld and permanently clear the trouble.

The value of Telafault will be evident in the saving of labor alone. There is also a large saving in the life of the cables, due to the fact that the trouble can be located without cutting in extra splices or cutting out long lengths of supposedly defective cable. With the old methods of testing where lightning trouble

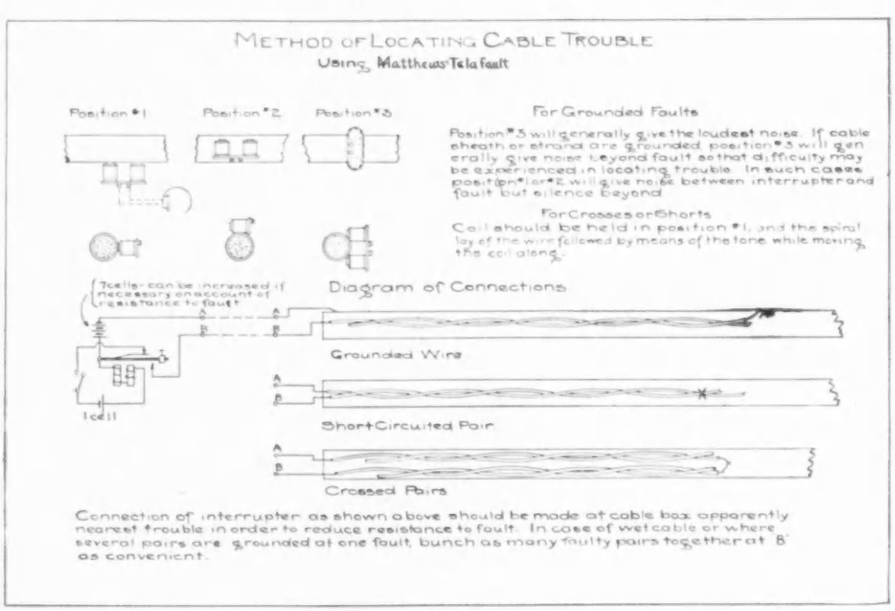

METHOD OF LOCATING CABLE TROUBLE
Using Matthews Telafault
Position #1
Position #2
Position #3
For Grounded Faults
Position #3 will generally give the loudest noise. If cable sheath or strand are grounded, position #3 will generally give noise beyond fault so that difficulty may be experienced in locating trouble. In such cases position #1 or #2 will give noise between interrupter and fault but silence beyond
For Crosses or Shorts
Coil should be held in position #1 and the spiral lay of the wire followed by means of the tone while moving the coil along.
Diagram of Connections
Grounded Wire
Short Circuited Pair
Crossed Pairs
Connection of interrupter as shown above should be made at cable box apparently nearest trouble in order to reduce resistance to fault. In case of wet cable or where several pairs are grounded at one fault, bunch as many faulty pairs together at B as convenient.

Diagram of the Telefault in Action.

is frequent it is not uncommon to see four or five splices within as many spans, where the cable has been opened for the sake of testing and exactly locating the trouble. With the new method the cable is opened only at the exact location of the trouble.

In using the Telafault the operating switch is closed and vibrator caused to operate freely. It should be adjusted to operate at one-half to two-thirds the frequency of ordinary ringing current, or to about 600 to 800 vibrations per minute. The frequency may be determined by the sound produced in the receiver when holding the exploring coil over the magnets of the interrupter.

The carbon block is then adjusted so that the armature of the vibrator makes substantial contact on it while vibrating. The correct adjustment for this is to have the arm of the armature strike the carbon block, but to clear the heads of the magnets about 1/64 inch. Of course, the interrupter battery must be in good condition and properly connected up. This may be ascertained by short circuiting the posts marked "A" and "B" with the pliers or screwdriver and noting the spark at the carbon block when the armature strikes it. If the spark is present, and a flow of current is thus indicated, the set is then ready for use.

The connections to be made are as indicated on the drawing, and are as follows:

For grounds, connect "A" to ground or to the cable sheath, and "B" to the wire in trouble. For a short circuited pair, connect "A" and "B" to either side of the pair. For crossed pairs, connect "A" and "B" to the wires of the pair which show crossed. In all cases the ends of the wire beyond the trouble should be left open.

After the connections have been made as above described, the next step is to place the coil over the cable, beginning usually at the end where the interrupter is applied and continuing at intervals until the trouble has been passed, or located within a span. If an aerial cable, the tester will then have no difficulty in locating the exact point of the trouble. Usually it is only necessary to climb alternate poles until the absence of the tone indicates that the trouble has been passed, after which the location can be narrowed down to the span in which it is actually located. The span located, the messenger should then be ridden and, by means of the coil, the exact location of the fault, within an inch or two, can be readily and accurately determined.

In order to have a minimum of resistance between the battery and the fault the interrupter should, if possible, be attached to the wires in trouble at the cable terminal nearest the probable location of the trouble. For all ordinary use, seven cells of battery in the interrupter box will be sufficient.

The magnitude of the induction in the exploring coil depends, of course, upon the strength of the field produced in the wire in trouble by the interrupted current, and upon the distance between the conductors in trouble and the sheath. If the pair in trouble is located in the center of a large cable, the induction will not be so loud as when the pair is in the outer layer of wires adjacent to the sheath. Under average conditions with the wires in trouble about midway between the center of the core and the sheath, and when seven dry cells (ten volts) are used as the source of interrupted current, the limiting resistance from the interrupter to the fault and return is, for grounds, 100 ohms; for shorts, 50 ohms. This limiting resistance can, of course, be raised by increasing the volume of the interrupted current. With 75 volts on the interrupter the limiting resistance is, for grounds, 750 ohms; for shorts, 375 ohms. These figures are only approximate, and are given to illustrate the scope of the exploring coil method.

With a high resistance ground, as, for example, in a cable which is only slightly moist, it is difficult to get enough current through the fault to be heard in the coil. In such cases results can sometimes be obtained by increasing the voltage of the interrupted battery. As high as 75 to 100 volts have been successfully used. In case of a wet cable it is generally best, in order to reduce the resistance, to bunch together as many of the wires in trouble as possible and to attach the interrupter to the bunch.

For example: Suppose a cable shows a 15-volt ground (10,000 w. ground). This would not be detected on a single wire by the exploring coil. By bunching together 50 pair (100 wires) in trouble, the resistance to ground may be reduced to approximately 100 w. By further increasing the voltage the measurement could be brought more easily within the limits. The objection to increasing the voltage is, of course, that it is not always easy to carry about more than seven cells, and it is not generally convenient to obtain as many as 50 or 75 cells for an immediate test.

In locating shorts the induction is generally not so loud as in ground or cross locations, for the reason that the current from the interrupter and the return current tend to neutralize one another on account of the twist in the cable pair. By moving the coil around the sheath of the cable the noise will generally be detected at that point where the conductor in trouble comes nearest the sheath. The coil should then be moved along the path followed by the spiral or lay of the wire in the cable.

The resistance of the fault, when due to a "loose" cross or ground, can sometimes be reduced and the efficiency of the coil thus increased by passing over tne conductor in trouble, via the trouble, a ringing current or 100-volt battery current before making the location test. This has the effect of partially welding the crossed wires at the point of contact.

The exploring coil can often be used in conjunction with a bridge measurement. An approximate location should be made by means of a Varley loop test, and the exact location can then be found with the coil.

Grounds caused by bullet holes, nails, etc., generally have one or more pairs with a low resistance to ground, and are among the troubles most quickly and accurately located with the Telafault.

Must Company Have City Franchise?

What will probably result in a test case, to decide whether the Bell Telephone Company must take out city franchises, or may operate under the state charter, as at present, is an announcement made by Mayor Bennett of Lansing, Michigan. The executive has sent a special message to the council, calling attention to the provisions of the new home rule law, and asking that the telephone company be forced to secure a franchise in Lansing.

What One Woman Thinks

By Sarah Elizabeth Brown

GEE, I wish that I was a man! There are times when I want to roll up my sleeves and get somewhere, and these times always come when I settle myself to write this stuff. The thing I am thinking about right now is the advertising of the Chicago Telephone Company in the Chicago papers. I call it pretty flimsy. It sounds like somebody who has been enjoying a cinch is afraid that competition will hurt. It quotes the Chicago papers as an authority for a single system. I want to inquire what a Chicago newspaper knows about the telephone business. Do any of them own telephone systems? Or are they afraid to incur the displeasure of a good customer? It seems to me that the Chicago Telephone Company might have something better to offer in its own defense than the editorial expression of newspapers that cannot know. I don't believe Bart Armstrong, editor of the Brown County *Recorder*, could tell us anything about running our system, and if he had any highfalutin notions of his own to offer, I'm pretty sure he would get them from Obediah. Chicago editors won't keep the Subway Company from installing 20,000 instruments, and it is my opinion that with 20,000 automatic telephones installed, the Chicago papers will need at least one each and that there are some people in the outlying suburbs that may need a few above the number that must be installed within the next year.

* * *

From afar off, it seems like the excitement of the business is settling in and around the Windy City. The splitting up of the Central Union into three parts is in itself one of the prettiest little moves that has been made in the telephone business for a long time. I'm sorry they haven't named the off-shoots from the old parent, but the name isn't so important after all. There's consolation in knowing that Central Union will have Illinois and in all probability it will take in the Chicago Telephone Company. Dame rumor spilled this out to me in March. It came all regular enough in the Chicago papers, which said "that it was reported to be the intention"—isn't that smooth—reported to be the intention of A. T. & T. Co. to merge the Chicago Telephone Company and Central Union, making a state-wide Illinois corporation. And right now, the Chicago Tel. and the A. T. & T. is denying any knowledge of Hank Evans' sale of the Inter-State. Don't I wish I was a man? Why, it's all on the dope sheet—has been for a long time. This fiddling around about it is something pathetic.

* * *

The A. T. & T. operate by the map. They look at the North American continent and then finger over a card index system. If it is all quiet on the Potomac, they go out and see the ball game. If the receivers of the Illinois Tunnel find their franchise may be lost unless they comply with its terms, and set about to serve themselves by ordering a couple of million dollars worth of apparatus, the Bell hears it and gets busy. They miss the ball game for a day or two. A bullet hole through a hornet's nest is a small thing, but it creates a lot of excitement. The announcement that the Subway Company would receive orders for a par-excellent telephone service has started the ball rolling and there is excitement of the keenest kind. Chicago Telephone Company furnishes good service, but it will surely furnish better service spurred by competition.

* * *

Before I get away from this Central Union deal, I would like to quote L. G. Richardson, president of that company, speaking for his directors who acted on the merger plan:

> They (the directors) further reported that the American Telephone and Telegraph Company had agreed to take, at par, of the three companies, $15,000,000 in stock. As there are now outstanding $6,000,000 in bonds against the entire property in the three states, the directors recommended that after the organization of the two new corporations each of the resulting companies should authorize bonds in an amount sufficient to pay its proportion of the outstanding bonds and to provide for a development fund until such time as the stock can be sold, at par, for such purpose.
>
> The stock present unanimously passed a resolution approving the plan and recommendation of the board of directors, believing that by so doing the three companies can be soon placed on a dividend basis. The resolution further authorized the directors elected at that meeting to carry this resolution into effect. It was provided in the resolution that any stockholder other than the American Telephone and Telegraph Company might, at any time within ninety days after he or she had been notified of the organization of the companies in Ohio and Indiana, respectively, exchange his or her stock, at par, for stocks in the new corporations organized, or either of them, or might hold the stock as it now stands on the books of the Central Union Telephone Company.

I have read a lot of fairy tales based upon the telephone, but I never read a better one than this. I have had it dinned into my ears that Central Union was "too dead to skin"—that it was in debt twenty million dollars or more and had never paid any dividends. It seems to me some one has been talking through their sky-piece, because it is hardly possible to finance a property by splitting up a concern into sections, make each responsible for two or three times the liabilities of the original and then bring the stock up to par before offering it for sale. I guess somebody has been doing a lot of deliberate, premeditated lying. Central Union may have been broke, but it hardly bears the earmarks of a down-and-outer.

* * *

Which brings me back to the Inter-State deal, which looks as though the fine hand of the map-operators in Boston had been at work. Reminds me of the antics of the big red barrow John is fattening. This particular hog is so fat, he can scarcely navigate, but at swilling time he will splash into the trough and try to get it all. With his plunge there is the usual overflow. The rest of the shoats get theirs in the mud while "old fatty" gets the short end for his trouble. In buying the Inter-State, the Bell will get a property that has never been liked by independents, because it was too all-fired arrogant to deal with them. The Illinois state conventions have always been more or less of a frost because the Inter-State had so much of the territory, and was so busy selling bonds that it couldn't attend. The banquets held back in 1902 and 1903 never enthused over anything stronger than sherbets or fancy ice cream, because the Inter-State didn't play fair. So in taking it over, the Bell must have thought it would prevent the independents from securing a Chicago connection. I'm sure the Bell will get the short end of it. I have watched the fight

for a long time and I'd be ready to forego the pleasure of a new summer hat if I thought it meant just what the Boston map operators have planned.

Have you noticed how lamb-like the Ohio situation has become? I knew it would be like that. J. P. Morgan & Company has been taken into full membership and the independents have the strongest ally that ever looked them over. For years and years the trouble has rested somewhat with independent securities. The hue and cry of financial houses have been against telephone investments, for a hundred trumped up reasons. I am as sure as Old Shep's scent in a fresh rabbit trail that Morgan butted into the Ohio deal by accident. Started in as a plain broker to buy something for his big client the Bell. When the racket started, he had time to look into a money-making proposition that would otherwise have escaped him. Finding that it was a "mere bagatelle," he froze on and if you want something surer than the scientist's dope on Halley comet, believe me when I say that Morgan will stay in this telephone business for a good long time. I'll venture the assertion that if there were some more trifling little systems ranging from ten to fifteen millions each, he would be scouting around with his check book.

* * *

Over the state line in Nebraska about two dozen telephone companies are giving the Railway Commissioners trouble because they have neglected to pay their occupation tax, thus forfeiting their charters. Any managers arounds the country looking for jobs? Seem to me Nebraska is pretty good territory for them. If there is anything in our assets which stand for net par, its our charter.

* * *

If it was left to me to specify the important accomplishments of independents for the first six months of 1910, I would name the killing of the Elson bill in Ohio and the arrangement independents have made with the Postal for the night letter.

Telephone School in Wichita

The Missouri and Kansas Telephone Company has started an operating school in Wichita, Kas. Miss Kate Mahaney, one of the ablest operators of the company, is the instructress, and under her careful and painstaking training have been placed ten young ladies, all selected with a view first to their living at home; natural intelligence, who can speak distinctly and write clearly; they must have good health, good eysight, good hearing, and a fair education. All student operators are placed at once on the payroll.

The course of instructions consist in the operating methods to be learned, supplemented by recitations on the subject studied, and by actual work at the practice switchboards. Student operators are taught the necessity of being courteous in all relations with the public, the use of the various parts of the operating department, and the proper method of completing any call. About three weeks form the period of study and practice before any girl is given a section of the switchboard. No operator is graduated from the school until she satisfies the principal or instructress that she is qualified to do the regular work in the exchange and to handle calls of any character.

The school in Wichita is located on the third floor of the Market Street Exchange building, and is well lighted and provided with every comfort and convenience. Besides Miss Mahaney, who is the accredited instructress, there is a matron to look after the girls, their lunches, comfort and health. She is Miss M. L. Moeller, a thoroughly experienced matron, as she was long with the Y. M. C. A. in the same capacity. It is her duty to prepare the noon lunches, make the coffee, and if any girl is taken suddenly ill, to summon a physician, and if not that serious, to call a cab and have her sent home.

Off the main student room is a tiny kitchen. The company furnishes tea, coffee and sugar and cream free, and provides the table, dishes, linen and silverware, and the girls bring their own lunches. No operators are required to work more than eight hours a day, which includes intermission for rest. All operators are given a vacation each year on full pay. In the rest room are provided easy chairs, couches and every other convenience to make it pleasant for the student operators. Lockers are also provided, where each girl may place her wraps.

Telephone Legislation in Ontario

At a recent session of the Ontario legislature the "Ontario Telephone Act" was introduced by Mr. Charters, and was passed, in spite of the fight put up against it.

The provisions of the act are as follows:

The Ontario Railway and Municipal Board is given jurisdiction to inquire into, hear and determine any application by or on behalf of any party interested; either in regard to complaints for failure to do, or for the doing of, anything contrary to the statutes on the subject; or request for any order or direction which it has the power to give.

The board has power to compel any company or person to do what is required by law, and to forbid anything contrary to law.

The board can make orders and regulations under the various acts, and inflict penalties up to $100.

All telephones tolls are subject to the approval of the board; and the tariffs shall be filed with the board.

The board may order that tariffs of tolls shall be made public.

Contracts between companies are subject to the approval of the board.

The board must compel any company to agree with any other company for connection, and can issue an order enforcing this.

All such contracts must be approved by the board before they have any force or effect.

No company is permitted to make any contract which has, or is designed to have the effect of increasing the costs or of restricting competition, until this has received the assent of the board.

Every person can compel telephone service, subject to conditions directed by the board.

Another act has also been passed amending the Local Municipal Telephone Act, the main provisions being as follows:

"Maintenance" is made to include cost of switching and superintendence of the system.

"Cost of construction" is to include that of improving or strengthening the original system.

The council of the initiating municipality may make terms for new subscribers; it may issue debentures for extensions, and levy annual rates for their re-payment, such debentures being issued on the credit of the Municipality, but no by-law need be submitted to the electors; it may make arrangements for advances of money, and pass a by-law for their re-payment.

Membership in the National Association

THE National Independent Telephone Association is now snugly ensconced in its new and splendid suite of offices in the McCormick building, at Michigan boulevard and Van Buren street, Chicago. From this point of vantage the officers of the association are issuing literature showing the benefits of membership, and offering inducements to prospective members which should bring a shower of new applications. The association's folder says:

It is the wish of the officers of the National Independent Telephone Association to promote the interests of the independent telephone companies to a greater extent even than in the past. It is the desire of the association to keep in close touch with the operating companies, for the purpose of gathering and distributing information.

This can be best done through the association members, because of the direct benefits obtained, and also the upbuilding of a stronger organization. Operating telephone companies are invited and urged to join the association.

The publications, pamphlets, etc., which the association gives each member are as follows:

Depreciation Report.—The result of the joint efforts and careful consideration given by the committee composed of W. Roy McCanne, Rochester, N. Y.; G. R. Johnston, Columbus, Ohio, and Charles E. Tarte, Grand Rapids, Mich. It is the most complete, conservative and sane handling of this all important subject yet published.

Telephone Magazine or Journal.—To each member the association will send for one year any independent telephone paper or journal desired.

Steel and Iron Wire Specifications.—This set of specifications is now on the press, and is the result of conference action of a number of larger operating companies. It contains plain instructions and simple methods of testing telephone wire, and will be invaluable to the smaller companies.

1910 Directory of Telephone Companies.

In addition to the above the association will also send to members, from pamphlets of previous years' publications, the following:

1. "Some Comments on the 1907 Annual Report of American T. & T. Co." by Gansey R. Johnston.
2. "Telephone Mergers Illegal" and "A Larger View," by A. C. Lindemuth.
3. "An Increase in Rates, Justified," by T. D. Atwater.
4. "What Telephone Monopoly Would Mean," by Wisconsin Telephone Association, 1907.
5. "A Discussion of Telephone Competition," by J. H. Ainsworth and G. R. Johnston, 1908.
6. "Exclusive Telephone Toll Contract Decisions," in the Delphos and Middlepoint, Ohio, and Monroe-Wayne, N. Y., cases, 1908.
7. Sundry Papers and Reports.

INFORMATION, DATA AND ADVICE.

The association has for years furnished valuable data and information to those seeking the same. It is planned, however, to enlarge these features of the organization.

While continuing to collect and give out schedules of exchange rates, copies of toll contracts, general and specific data and information, etc., it is aimed to also directly aid those companies desiring advice or opinions upon operating or reconstruction problems arising, particularly of a legal or engineering character.

This can be done to a reasonable extent by the association, and without cost to members, and these opinions be furnished by professional men of established reputation and ability in their chosen fields.

It is believed that the smaller companies, especially those not having the advantage of telephone engineering or legal experts, will find this department of the National association of great practical value.

In addition to the above it is the aim of the association not only to properly care for all requests made upon it, but to furnish to the members, from time to time, information of particular interest or value, and which, for some reason, may not be given advantageously through the telephone journals or the daily press.

Below is the form of application for membership, which will be sent upon request.

MEMBERSHIP APPLICATION.

National Independent Telephone Association.

The undersigned Independent Telephone Company hereby makes application for membership in the National Independent Telephone Association in accordance with the provisions of the constitution of said association, and for the purpose of securing membership makes the following statements and agreements:

1. Name of Company.....
2. Headquarters at .....State .....
3. Name of owners, if individual or firm.....
4. If unincorporated, when formed.....How many stockholders? .....
5. If incorporated, when?.....In what State?.....
6. Present officers:
   President .....Address.....
   Secretary .....Address.....
   Manager .....Address.....
7. Capitalization: Bonds(——%) Issued $.....
   Stock issued: Common $.....Preferred $.....
8. No. of stockholders.....Telephones in operation.....
9. Description of contracts with other companies.....
10. Rates charged for service .....

The undersigned agrees to connect up its lines with Independent Telephone Companies in contiguous territory and to interchange telephone business for a period of one year, and from year to year thereafter, unless written notice to terminate the contract shall be given 30 days prior to the end of any year. In case the applicant cannot agree with companies owning or building such lines as to the incidents or apportionment of the cost of such connection or connections, the same shall be referred to the board of directors of the association for settlement and the award of the board thereon shall be binding on both parties. No member of the board shall participate in the determination of any matter in which he shall be interested directly or indirectly, but the same shall be determined by the remaining members of the board.

Applicant further agrees to pay a membership fee upon the acceptance of this application by said association, of Ten Dollars and to pay an annual membership fee thereafter as long as it shall remain a member of the association, for the same amount. Any further annual dues to be paid by the applicant shall be voluntary subscriptions made by him.

Applicant further agrees to furnish to the National Association annually such data and statistics covering its exchanges and toll lines as the said association shall request.

This application shall be in full force and effect when accepted by the National Independent Telephone Association. Thereupon the applicant shall become entitled to all of the rights and privileges accorded to the members of said organization.

European Telephone Connections

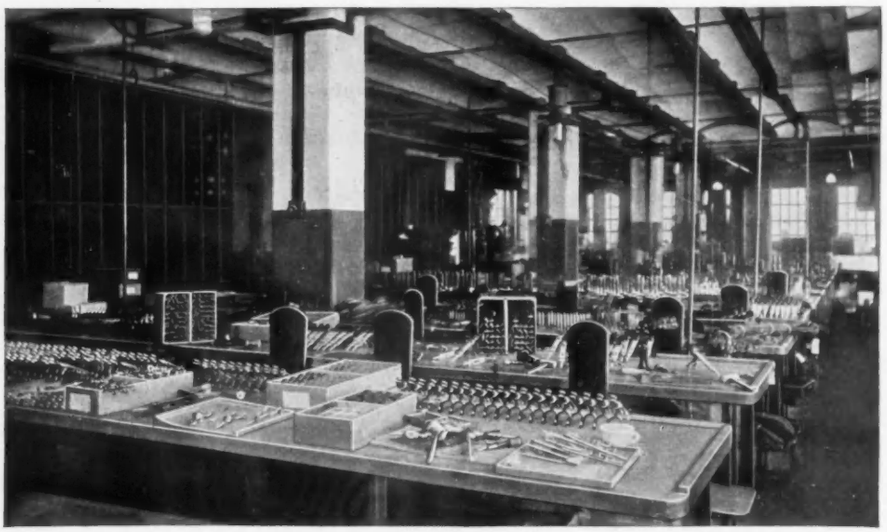
Consul Horace Lee Washington calls attention to the fact that it is possible to telephone from Liverpool to Paris (including suburbs), Brussels, and several provincial towns in France and Belgium, adding:

This may be of value to American business men arriving in Liverpool. A list of various towns in connection is obtainable at the Liverpool central postomce. The fee for three minutes' use of telephone with France or Belgium is 8s ($1.95), except to Bordeaux, St. Etienne, Marseilles, and Lyons, for which it is 10s. ($2.43). For regular service, reduced rates may be obtained at night if one call is made nightly for at least one month for conversations over the Anglo-French and Anglo-Belgian circuits for double periods of six minutes. It is stated by the Liverpool Chamber of Commerce that steps are being taken to establish telephone communication between this city and Germany.

The Evolution of the Desk Stand

By D. H. Braymer

THE development of the desk stand in the comparatively few years of its existence has been with the idea of simplicity of design. This point is well illustrated by the accompanying photograph of four successive types of desk stands, arranged in chronological order.



Assembling Telephone Desk Stands.

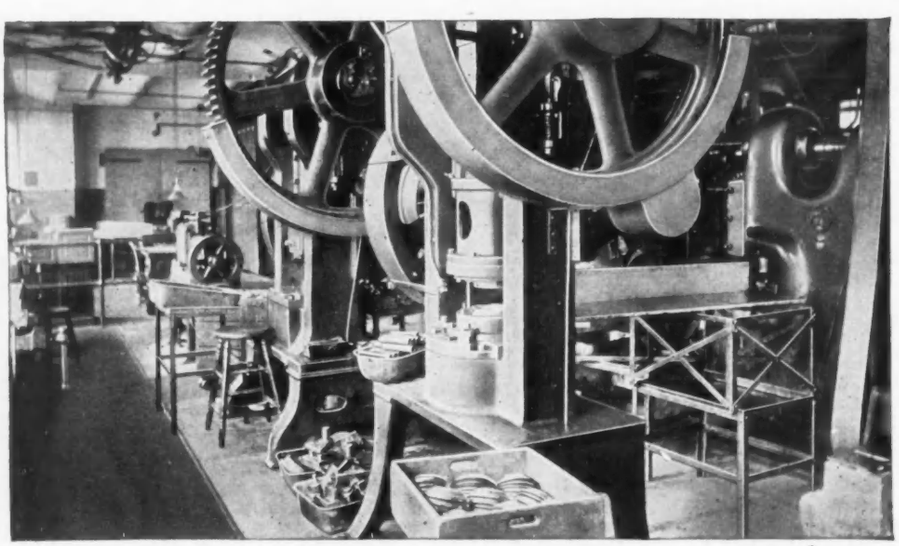
The two on the left in the group are among the first designs of desk stands, and are known as the Western Electric No. 9. These stands were made in two sizes, as shown in the illustration, and first placed on the market late in 1898, being manufactured until 1902. The next stand to the right is known as the No. 10 type, and was first manufactured during the year 1909, and was considered the standard up to 1904, when it was replaced by the No. 20 type, the last stand which is shown at the right in the photograph. The No. 20 stand has been improved from time to time since 1902, and at the present time it is the standard desk stand used by the Bell companies.

In the latest type of the No. 20 stand all working parts are concealed, and the design of the stands is on very simple lines, which is in decided contrast to the older types.

The desk stand shown here, and as selected for the purposes of this article, does not include the transmitter and receiver, which are, of course, the most familiar parts of the complete ordinary desk telephone.

The accompanying illustrations show two of the departments at the New York factory of the Western Electric Company through which a desk stand passes from the time the metal is drawn from stock until the finished set is turned into the storeroom.

In the process of manufacture a desk stand is divided into several parts. Each part is made complete, independent of any other part. The principal parts are the base, handle, transmitter lug holder, hook and terminal plate. The base is made from strips of sheet brass, No. 12 B. & S. gauge, 6 inches wide by 6 feet long. This metal strip is passed through punch presses, where the base is blanked, formed and pierced for the center hole and cord hole.



Punch Presses Stamping Out Desk Stand Bases.

The handle is made from lengths of seamless brass tubing, 1¼ inches outside, expanded and threaded inside at the base end for the clamp nut which connects it to the base. The transmitter lug holder consists of two parts, the head and base. The head of the lug holder is made from sections sawed from special drawn stock, having the same general outline as the finished head. After being sawed from an original bar, the lug holder is slotted, turned down, threaded and the base screwed on, ready for further assembly. The switch hook is made from blank sheet stock in right and left sections,

which sections are bent to the proper shape and riveted together.

The finished stands are provided with a base plate, covered with a felt pad, which is secured to the base by means of a clamping ring. The whole is made secure to the stand by screws in the clamping nut.

The assembly of the desk stands is divided into three separate sections—the assembly of the base and handle, the assembly of the lug holder, switch hook and terminal plate upon which the working parts have previously been fastened, and, finally, the assembly of these two parts, together with the screwing on of the base plate.

All the finished parts are kept in storerooms near to the point where the assembling is done. The first process in the assembling of the desk stand is the joining of the base and handle, which is done by screwing the clamp nut through the base into the expanded end of the handle.

The next step in the process of final assembling is to fasten the hook to the lug holder and screw the necessary working parts fast to the terminal plate, which is then assembled to the lug holder and switch hook.

Types Showing the Evolution of the Desk Stand.

After these operations are completed the transmitter and receiver cords are attached; then the base plate and handle are assembled with the lug holder, switch hook, etc., which completes the desk stand.

During all the process of manufacture and assembly all the material and operations are thoroughly inspected and all the working parts are carefully tested to insure their being in perfect order when shipped.

The Making of Telephone Wire

By J. F. Tinsley*

OF the multitude of wire products turned out by the wire manufacturer of today, there is perhaps none that demands as high a state of perfection in the art of steel making and wire drawing as that of telephone wire. The reason for this is found in the many requirements exacted of the telephone wire in service. In the first place, the telephone wire must be of such composition that it fulfills to the best degree the function required of it, namely, the transmission of electrical currents. Consistent with the physical requirements demanded, the telephone wire must be such as to offer the least resistance to the passage of the electrical current, that is, it must be of the highest electrical conductivity. High resistance in the wire means higher battery or other form of energy in the stations which supply the power through which the wire performs its valuable functions in the service of mankind. It also means high and uneconomical cost of maintenance and, of greater importance still, it means a less efficient performance of the work expected of the wire. Of equal importance to the electrical properties are those physical characteristics which render the wire able to act as an efficient and loyal agent in its duty of transmitting human speech. It must be such as to be handled easily by the lineman in the work of construction and repair and to accommodate itself to heavy strains put upon it in the making of splices, ties, etc., that shall be efficient and permanent. It must be such as not to stretch too much in the heat of summer or contract too much in the cold of winter, and it must endure the none too tender forces of nature in the way of rains, winds, snow, sleet and ice.

With the above stated conditions that telephone wire is called upon to meet in service, we are brought to the final and all important feature of the telephone wire from an economical standpoint, at least. Unfortunately, iron and steel have a strong affinity for oxygen and if a wire of this kind is left unprotected from the oxygen of the air, this inclination develops rapidly and oxidation, or what is familiarly known as rusting, occurs. Then, too, there are other corroding influences such as sulphur in smoke from factories, railroad locomotives, etc. To prevent rusting

* *W. & M. Telephone Wire News.*

and to secure an effective protection against the various other corroding influences, the wire must be carefully and evenly coated with a metal having little affinity for oxygen. In a word, it is covered with a galvanizing layer of pure zinc spelter.

Such is the galvanized telephone wire as we know it today and in the light of the preceding, it will perhaps be understood why it is one of the most particular of wire products. It will also be readily appreciated why there is necessary, in the production of such wire, the most careful selection of the materials used in its manufacture, the best equipment and processes, and the highest degree of skill and experience in everyone directly connected with the manufacture of the wire. Previous to melting, the raw materials must be carefully tested, selected and properly apportioned in the melting furnace; the time and degree of heating must be carefully followed by experienced men—so also in the pouring of the molten metal into ingots, in the subsequent rolling of ingots to billets, of billets to rods and in the drawing, cleaning and galvanizing of the wire. Nowhere in the various processes must any "hit or miss" method be pursued if the best wire is to be produced and care is the watchword all a'ong the line.

The final operation is an exhaustive series of electrical and physical tests on every bundle of wire produced to remove all questions of possible doubt as to its quality, and by a galvanizing test to determine if the zinc coating is continuous, is elastic and of sufficient thickness and fully up to the highest commercial standard. In this connection, it should be added that this test is a chemical test to determine the thickness of the galvanizing coating and not a mere visual test. The life of a galvanized wire is a function of the thickness and grade of galvanizing and not of the color of the galvanizing. No greater mistake could be made than to buy telephone wire on what is properly termed "looks." Under the corroding influences of the smoke and air, the "looks" of the wire soon fade and something other than this is required in order that efficient and economical service and long life be rendered.

In general commercial use today, there are three standards of telephone wire—Extra B. B,, B. B. and Steel. These are arbitrary terms adopted several years ago and have at the present time no special significance in themselves. The three grades are all made from the very best materials by the most improved processes under the careful direction and supervision of skilled and experienced men. The Extra B. B. grade has the highest electrical conductivity as well as possessing great toughness and strength consistent with its low electrical resistance. This is not used, however, in as large quantities for telephone lines as for telegraph lines, while the other two grades are used principally on telephone lines where the highest grade of electrical conductivity is not essential, but in which strength, toughness and long life are the prime factors. It should be emphasized, however, that while the three grades differ in regard to physical characteristics, there is no difference in the standard as regards galvanizing. All grades are galvanized to the highest commercial standard—a standard which is the result of over half a century's experience in the art.

Much might be said in detail in addition to the above, relative to the special nature of the manufacture of telephone wire, all of which would be bound to strengthen one's conclusion that the telephone wire that is best is that which is the result of long experience, superior skill and best materials and equipment on the part of the wire maker. In telephone wire it is particularly true that it takes the best to produce the best.

An Advertising Talk by Telephone

Eighty-two members of the Fort Worth, Tex., Ad Men's Club, at luncheon in the private dining room of the Hotel Worth, heard an address over individual telephones delivered by Frank B. Knight in his Dallas office. This proved to be the interesting "stunt" which the members of the program committee had promised the club, but about which they had preserved the utmost secrecy until the members assembled for the weekly meeting.

Mr. Knight is the head of the publicity department of the Southwestern Telephone and Telegraph Company, and his address, which was perfectly audible to every one present, was on "Telephone Publicity." He spoke, in part, as follows:

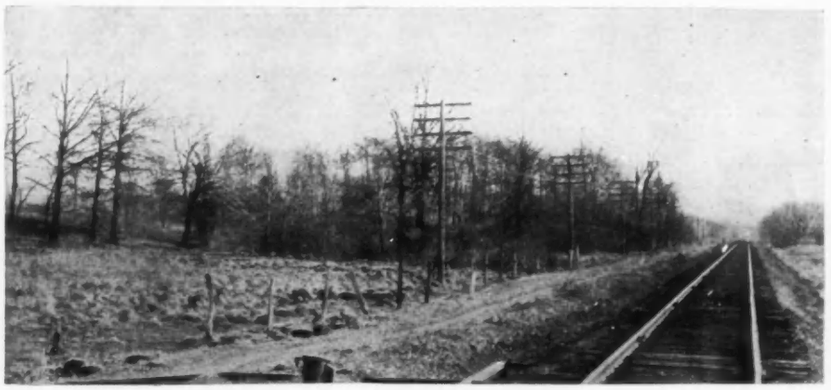
Even in this age of progress and achievement, when, it would seem, every known agency is employed for the convenient and expeditious dispatch of business, it is strange how many people remain ignorant as to the varied uses to which the telephone can be put and how it can serve them in lightening the load of detail with which they are burdened. But a vigorous campaign of education is being carried on, as you must have observed in the press and in the monthly periodicals, which in its extensiveness and cost has rarely been equaled in the advertising annals of this country and which is bound to go a long way toward directing attention to and stimulating the use of the wonderful inventions and devices embraced in the present advanced art of telephony.

The growth of the Southwestern system in Fort Worth is a strong tribute to the sagacity and progressive spirit of its business men. In the short space of ten years almost 8,000 telephones have been added to this exchange, and quite as large, or a larger proportionate growth is predicted for the future, and preparations are being made with that end in view. This increase is not alone attributable to increase in population, but is largely accounted for because of recognition on the part of the public of the usefulness and convenience of the service which becomes more and more apparent as time passes.

The prime object of all advertising is the production of increased revenues, and in the case of the telephone companies this has been and will continue to be effected not alone through an increased volume of business, but by inducing the public to subscribe for a higher and more expensive grade of service. This is a legitimate subject for advertising which, of course, is being exploited.

The use of the telephone has reached its present remarkable stage in the short space of a little more than thirty years. No commercial enterprise ever before launched has entered so thoroughly and intimately into the business and domestic affairs of the nations, especially the American nation, which has outstripped the world in the use and development of the telephone—or has attained such colossal proportions in the way of a great organization. That much of the growth and success of the Bell companies is due to advertising is hardly to be gainsaid, and the logical conclusion is reached that since the cost of advertising to these companies reaches such large proportions they are convinced that advertising pays.

While all the receivers were down the members of the club applauded liberally, and Mr. Knight thanked them for their appreciation of the compliment they had shown him. The progressiveness of the company in placing such a novel feature at the disposal of the ad men was commented upon very favorably by the members, and there were some who insisted on taking the telephones home with them as souvenirs of the occasion.

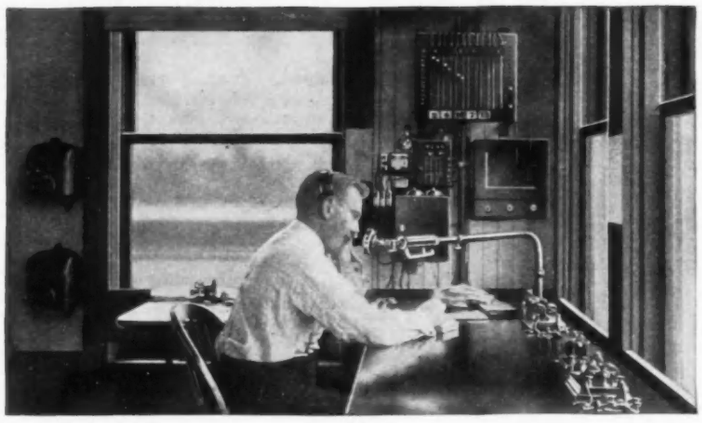


DEPARTMENT of RAILWAY TELEPHONES

Use of Telephones for Train Orders

Report of the Interstate Commerce Commission

PERHAPS few people realize, even among those whose daily work is intimately connected with the handling of railroad trains, what tremendous progress the telephone has made in replacing or assisting the telegraph for transmitting train orders. Railroads are proverbially conservative in adopting new practices, especially of a technical nature—made so, no doubt, by the fact that since the inception of railroading the field has been particularly attractive to inventors. And when the proposed change involves a considerable outlay of money—as, indeed, most railroad changes necessarily do—it is not surprising that considerable hesitancy should be shown. The telephone has probably met with its due share of opposition from railroad engineers; and its success in so short a time is the more remarkable.



The Telephone Invasion of the Railroad Field.

The telephone invasion of the railroad field has been quite unostentatious—almost deprecatory. Unheralded save for an occasional trade article or a local newspaper item, it has already reached a point where we can confidently expect it ere long to dominate the transmission of railroad communications of all kinds.

The compilation given on the following pages covers the use of the telephone for transmitting train orders. Besides this work, there is a considerable use of the telephone in connection with manual block systems, although the telegraph still holds its own in this division. In the regular transmission of train orders, however, it is interesting to note that although the total number of miles of railroad so operated in this country is 26,344, that figure represents but a fifth part of the present total mileage of railroad, which is 131,014. It is unnecessary to comment on the great field which is open to the telephone here, and for which apparatus must inevitably be supplied within the next few years.

This list is designed to include all railroads in the United States on which telephones are used for the transmission of train dispatchers' orders which confer, restrict, or change the road rights of trains. Practically all railroads use either the telegraph or the telephone for this purpose, and it may be assumed that the Morse telegraph is used on (*a*) roads not appearing in this list, and (*b*) on those roads here shown, to the extent that the telephone is not reported in use. For example, the Baltimore & Ohio has 20 miles on which the telephone is used and 3,454 miles on which the telegraph is used. It will be understood that this list has no bearing on block-signal lists. Except on lines of very light traffic, train dispatchers' orders are constantly required in connection with the movement of trains,

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical developments, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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whether the block system is or is not used; but on a line where it is not used the function of the train order is relatively more important. Without the block system a "train order" may be and usually is a vital factor in the safe movement of the train or trains affected by it. With the block system, the block signals providing the required safeguard against collision, the function of the train order may be one of convenience or celerity only. Following is the list of railroad lines on which the telephone is used for the transmission of train orders, the first column of figures showing the telephone mileage and the second column the total mileage:

Aberdeen & Rockfish	54	54
Alabama Central*	7	7
Albany Southern	36	36
Alcolu	25	25
Angelina & Neches River	13	13
Arcadia & Betsey River*	21	21
Arkansas & Gulf*	17	17
Arkansas Southeastern	36	57
Ashland & Western	22	25
Atchison, Topeka & Santa Fe:		
Eastern lines	1,412	5,564
Coast lines	393	1,908
Gulf, Colorado & Santa Fe	193	1,518
Santa Fe, Prescott & Phoenix	6	364
Texas & Gulf	96	96
Atlantic & Western	9	10
Atlantic Coast Line	139	4,181
Attleboro Branch	4	4
Augusta & Summerville	4	4
Au Sable & Northwestern	59	67
Baltimore & Ohio	20	3,474
Beaver Dam	10	10
Bellefonte Central	27	27
Bennettsville & Cheraw	34	34
Big Sandy & Cumberland	17	18
Birmingham Southern	22	25
Boston & Maine	51	2,294
Boyne City, Gaylord & Alpena	70	93
Brookhaven & Pearl River	23	23
Brownstone & Middletown	3	3
Caldwell & Northern	3	24
Campbells Creek*	13	13
Catskill Mountain	20	20
Charlotte, Monroe & Columbia	18	18
Chattahoochee Valley	33	34
Chesapeake & Ohio	135	1,703
Chesapeake-Beach	28	32
Chesterfield & Lancaster	35	35
Chester, Perryville & Ste. Genevieve*	99	99
Chicago & Alton	16	981
Chicago & Illinois Western	7	17
Chicago & North Western	551	7,638
Macoupin County	23	50
Chicago & Wabash Valley	32	37
Chicago & Western Indiana	.....	50
Belt Ry. of Chicago	21	.....
Chicago, Anamosa & Northern	20	20
Chicago, Burlington & Quincy	2,437	8,948
Chicago, Milwaukee & St. Paul	337	7,481
Chicago, Milwaukee & Puget Sound	635	1,462
Chicago, Rock Island & Pacific	642	7,393
Chicago, Rock Island & Gulf	48	530
Chicago, Zeigler & Gulf	7	16
Cincinnati, Georgetown & Portsmouth	6	7
Coal & Coke	191	191
Colfax Northern	14	14
Columbus & Southern	23	25
Colusa & Lake*	22	22
Cumberland Valley	54	162
Delaware, Lackawanna & Western	900	957
Delray Connecting	14	16
De Queen & Eastern	27	27
Denver & Inter-Mountain	13	22
Denver & Rio Grande	32	2,598
Boca & Loyalton	45	45
Detroit & Mackinac	70	263
Dover & South Bound	25	25
Dry Fork	32	37
Duluth & Iron Range	168	169
Duluth & Northern Minnesota*	55	55
Dunbar & Wausaukee*	14	14
Durham & Southern	60	61
East Broad Top R. R. & Coal Co.	50	50
East Carolina	38	38
East Jordan & Southern	19	30
Erie	146	1,869
Escanaba & Lake Superior	80	142
Evansville, Suburban & Newburgh	25	25
Flint River & Gulf*	25	25
Flint River & Northeastern	24	25
Florida	52	65
Gainesville Midland	72	74
Galesburg & Great Eastern	11	11
Georgia & Florida	80	284
Glenfield & Western	19	19
Grafton & Upton	17	17
Great Northern	1,511	6,536
Great Western	55	57
Greenwich & Johnsonville	32	32
Griffen, Magnolia & Western	25	29
Gulf & Interstate	71	71
Gulf Line	14	77
Hardwick & Woodbury	10	11
Hazelhurst & South Eastern	16	24
Hoosac Tunnel & Wilmington	24	25
Houston & Brazos Valley	20	20
Huntingdon & Broad Top Mountain	45	70
Idaho Northern	57	57
Illinois Central	1,706	4,577
Omaha Bridge & Terminal	10	24
Indianapolis Union	13	13
Interstate	24	27
Ironton	7	12
Jamestown, Chautauqua & Lake Erie	33	39
Jefferson & Northwestern	30	30
Kane & Elk	7	15
Kansas City Belt	7	64
Kansas City, Clinton & Springfield	3	155
Kansas Southern & Gulf*	9	9
Kentucky & Indiana Bridge & R. R. Co.	10	10
Kentucky & Tennessee	8	11
Kentwood & Eastern	46	49
Lackawanna & Wyoming Valley	23	23
La Crosse & Southeastern	36	40
Lake Champlain & Moriah	7	8
Lake Tahoe Ry. & Transportation Co.	16	19
Lancaster, Oxford & Southern*	28	28
Laramie, Hahn's Peak & Pacific	55	55
Lawrenceville Branch	10	10
Lehigh & New England	90	170
Lehigh Valley	159	1,394
Liberty-White	34	51
Ligonier Valley	14	16
Little River	8	26
Los Angeles & Redondo	37	39
Louisiana & Pacific	69	87
Louisiana Central	18	76
Louisiana Southern	45	45
Louisville & Nashville	251	4,598
Ludington & Northern*	7	7
Manahawkin & Long Beach Trans. Co.	21	21
Manchester & Oneida	8	8
Manistee & Repton*	20	20
Manistique & Lake Superior	65	65
Manitou & Pike's Peak	9	9
Mansfield Ry. & Transportation Co.	16	16
Marinette, Tomahawk & Western*	45	45
Marion & Rye Valley*	18	18
Marquette & Southeastern	27	56
Maryland Electric Railways	25	25
Mason City & Clear Lake	15	18
Mattoon	10	30
McCloud River	86	86
Mesabe Southern*	28	28
Middleburgh & Schoharie*	6	6
Mineral Point & Northern	30	30
Minneapolis & Rainy River	86	86
Mississippi Eastern	28	28
Missouri & Louisiana	24	28

Missouri Pacific:		
Arkansas Midland	48	70
Little Rock & Monroe	45	45
Monongahela	48	66
Montour	12	13
Moscow, Camden & San Augustine	7	7
Mount Airy & Eastern*	19	19
Mount Jewett, Kinzua & Riterville	38	38
Munising	23	76
Nacogdoches & Southeastern	12	13
Natchez, Columbia & Mobile	28	29
Natchez, Urania & Ruston	16	16
Nevada-California-Oregon	27	224
Sierra Valleys	37	37
Nevada Central	93	93
Nevada County Narrow Gauge	21	23
New Jersey, Indiana & Illinois	12	12
New Orleans, Mobile & Chicago	7	401
New Orleans Terminal	16	26
Newport & Sherman's Valley	28	30
Newton & Northeastern:		
Fort Dodge, Des Moines & Southern	200	200
New York & Pennsylvania	56	57
New York Central lines:		
Cleveland, Cincinnati, Chicago & St. L.	110	1,848
Chicago, Kalamazoo & Saginaw	56	56
Detroit & Charlevoix	43	52
Fulton Chain	2	2
Lake Shore & Michigan Southern	255	1,575
Lake Erie, Alliance & Wheeling	88	88
Little Falls & Dolgeville	2	14
Michigan Central	757	1,792
New York Central & Hudson River	497	3,195
New York, Chicago & St. Louis	132	523
New York, New Haven & Hartford	11	2,003
Norfolk & Portsmouth Belt Line	8	9
Norfolk & Southern	97	592
Norfolk & Western	210	1,942
Northampton & Bath	7	7
Northern Pacific	597	5,698
Northwestern Pacific	117	408
Ohio & Kentucky	27	27
Ohio Electric	242	242
Ohio River & Columbus	24	24
Ohio Valley Electric	16	16
Oregon & Eureka	33	33
Pacific & Idaho Northern	76	76
Pajaro Valley Consolidated	29	42
Pennsylvania	1,126	5,299
Grand Rapids & Indiana	8	592
New York, Philadelphia & Norfolk	16	112
Philadelphia, Baltimore & Washington	11	694
Waynesburg & Washington	29	29
Wheeling Terminal	5	10
Pensacola, Alabama & Tennessee*	23	23
Philadelphia & Reading	28	1,099
Williams Valley	8	11
Philipsburg & Susquehanna Valley	16	16
Pittsburg, Shawmut & Northern	29	230
Pittsburg, Summerville & Clarion	21	22
Pittsburg, Westmoreland & Somerset	26	26
Placerville & Lake Tahoe*	8	8
Portland Ry. Light & Power Co.	54	99
Poteau Valley	6	8
Potomac, Fredericksburg & Piedmont	38	38
Quanah, Acme & Pacific	38	38
Rahway Valley	6	10
Raleigh & Charleston	41	43
Randolph & Cumberland	19	19
Reynolds & Falls Creek	15	16
Rio Grande & Eagle Pass	26	27
Rio Grande & Pagosa Springs	21	21
Rural Valley	5	8
Raleigh & Southport	35	61
St. Paul Bridge & Terminal	3	3
Salem, Falls City & Western	27	27
Saline River*	25	25
Salt Lake and Los Angeles	15	15
Salt Lake & Mercur	12	12
Salt Lake & Ogden*	36	36
Sandy River & Rangeley Lakes	78	105
Sanford & Troy	12	12
Savannah & Statesboro	33	33
Schoharie Valley*	5	5
Seaboard Air Line	149	2,987
Sebasticook & Moosehead	15	15
Sibley, Lake Bisteneau & Southern	28	28
Silverton*	17	17
Silverton Northern*	15	15
Slate Run	5	5
Sligo & Eastern	13	13
South Buffalo	7	7
South Georgia	77	77
Southern Pacific (Pacific system)	292	6,112
Corvallis & Eastern	21	140
Spokane & British Columbia	37	60
Spokane & Inland Empire	165	178
Stanley, Merrill & Phillips	31	49
Stewartstown*	7	7
Sugar Land	14	27
Sumpter Valley	62	62
Susquehanna River & Western*	14	14
Tabor & Northern	11	11
Tacoma Eastern	16	92
Tellico	24	24
Tennessee & Cumberland River	15	15
Tennessee & North Carolina	22	22
Texas, Arkansas & Louisiana	8	8
Texas Short Line	9	9
Thornton & Alexandria	23	23
Timpson & Henderson	34	34
Tioga & Southeastern	15	15
Tionesta Valley	51	90
Toledo & Western	80	81
Toledo, Angola & Western	10	10
Toledo Terminal	29	34
Tombigbee Valley*	62	62
Tremont & Gulf	99	99
Trinity Valley Southern	6	6
Uintah	54	55
Unadilla Valley	20	20
Union & Glenn Springs	19	20
Union Pacific	123	3,384
Oregon Short Line	49	1,509
United Verde & Pacific	26	26
Ursina & North Fork	5	5
Valley	11	11
Victoria, Fisher & Western	25	41
Virginia & Kentucky	1	4
Virginia-Carolina	15	32
Virginian	470	472
Wabash:		
Wabash-Pittsburgh Terminal	4	64
Wheeling & Lake Erie	6	442
Warren & Ouachita Valley	16	16
Washburn & Northwestern*	95	95
Washington, Baltimore & Annapolis	61	61
Waterloo, Cedar Falls & Northern	8	65
Wellington & Powellsville*	22	22
West Side Belt	21	22
West Virginia Northern	10	10
Wharton & Northern	14	21
Winifred*	7	7
Wisconsin & Michigan	8	128
Williamsport & North Branch	44	46
Eagles Mere	10	10
Woodstock	14	14
Woodworth & Louisiana Central	6	24
Youngstown & Southern	20	25
Yreka	8	8
Total	26,344	131,014

*Road furnished no report. Table published in Official Guide indicates that it is worked with the telephone.

W. W. Ryder, superintendent of telegraph of the New York Central lines west of Buffalo, with offices in the LaSalle Street Station, Chicago, has been appointed general superintendent of telegraph of the Toledo & Ohio Central Railway and the Zanesville & Western Railway, the appointment taking effect May 2.

Safeguarding Railway Telephone Service

The lines of telephone communication of an interurban railway system are like the nerves in the body: when they break down co-ordination ceases and confusion reigns. In the early days of interurban construction small importance was attached to the telephone line, which was strung with light iron wire and built as cheaply as possible. Some of these old lines have given excellent service, but they are depreciating rapidly, and every storm results in broken wires and a more or less complete tie-up of operation until the breaks are located and repaired. As a general rule, the roads with the most unreliable company telephone lines have made the least provision for connecting up in times of emergency with the public long-distance telephone systems and the telegraph companies. One road in the Middle West which operates over 100 miles of track went through the experience of trying to operate with a single, worn-out telephone line, and as a result of one severe winter's interruptions decided that a first-class duplicate line was none too good. It installed a copper despatcher's line and a company business line from end to end of the road, made an arrangement with the telegraph company whose wires were strung on a parallel steam railroad right-of-way to give preference to all emergency messages, and contracted with both the long-distance telephone companies to install their instruments in every station and substation, with the understanding that railway calls were to be rushed through. There has not been an occasion when it has been necessary to annul a train or flag through because the crews could not get into communication with the despatcher. A few times only both of the railway companies' lines have failed together, but the long-distance service was immediately available and serious delays to trains were avoided. The cost of the duplicate long-distance service is considerable, but when it is needed it is well worth the price paid. The necessity for rule 203a in the standard code of interurban rules is not concurred in by the officers of this road nor would it be by any other company which had taken the same precautions against failure of the train crews to get into communication with the despatcher.—*Electric Railway Journal.*

Telephones Satisfactory on Lehigh Valley

Dispatching trains by telephone on the Lehigh Valley Railroad has proved, according to a report submitted to the general manager of the company, a thorough and positive success in every sense of the word. The new system, now in operation on about 150 miles, is to be extended rapidly.

The defects in the working of the telephonic apparatus have been slight compared with those that are common with the telegraphic system. It is found, for example, that a crossing of wires which would put a stop to communication by telegraph, hardly ever interferes with telephone talk between stations.

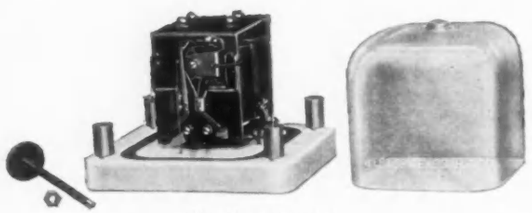
Two special features have contributed to the Lehigh Valley's success with telephones; one is a storage battery, that affords a constant voltage for selector work; and the other is the swinging "arm," which makes it necessary for every operator to talk directly into the transmitter. Further improvements are to be put into effect with the extensions of the service.

As a result of the company's success in the use of the telephone, several of the most important railroads in the country have sent letters requesting complete information about the details of the system.

A New Railway Telephone Selector

For more than a year it has been an open secret that the engineers of the Western Electric Company were working in conjunction with some prominent railway people on the development of a selector which, with standard telephone apparatus, would enable them to offer a complete Western Electric installation to their railway customers who are interested in the use of the telephone for train dispatching or message work.

The final model of the Western Electric selector was made several months ago and since then a complete installation has been undergoing service test on one of the busiest railroad divisions to be found in the United States. The trial installation proved even more successful than was expected.



The New Selector.

During the last few days prominent superintendents of telegraph have been visited by the Western Electric Company's railway experts, who brought along working exhibits of their new selector outfit. Orders have already been placed for the new selector by three of the largest railway systems. The new selector is a very simple device, being a straight step-by-step mechanism with but three moving parts, bridged directly across the line. There is only one contact made and as all relays and other complicated parts are eliminated it is claimed that the selector is as near perfect as it is possible to make it. Central battery ringing is provided for, thus doing away with the necessity of installing dry batteries at the way stations. The selector is also arranged for local battery ringing if desired.

It will be of interest to all railway men who are studying the telephone problem to know that the foremost engineers are giving so much time and thought to the improvement of the art.

The new selector is illustrated by the accompanying cut.

Great Northern Pushing Telephones

E. J. Little, superintendent of telegraph for the Great Northern Railway company, has been canvassing the ground in Seattle, Wash., with a view to connecting Seattle and Spokane with a telephone train dispatching system, which will entail the installation of full metallic circuits. With the completion of the Cascade division the Great Northern company will have nearly 4,000 miles of telephone lines in use.

All of the wire in use by the Great Northern railway for telephone purposes is copper-clad steel, made by the Duplex Metals Company. The total amount of this wire which the road has purchased up to the present time is approximately nine thousand miles—something like 1,700,000 pounds.

Trouble on Railway Composite Lines

By Martin J. Ryan*

LAST month in this department the installation of railway composite lines was discussed.* Such a system, once installed, is of course heir to the usual possible troubles of an ordinary telephone line, and has a few possibilities of its own besides. However, maintaining a composite system in good order is not difficult, with ordinary care and watchfulness.

When the system is not working properly, the trouble may be due to the line being out of order, to a defect in the apparatus or wiring in the telegraph stations; or to a defect in the apparatus or wiring in the telephone stations.

Line trouble is cleared by the usual methods employed in all telegraph systems.

Trouble at telegraph stations equipped with telephone apparatus, must be either in the telegraph apparatus, the condenser, or the resistance. Trouble in the telegraph apparatus should be cleared in the usual way. If the condenser is short-circuited, no telegraph messages can be sent from that station; if the condenser is open, there will be poor telephonic transmission beyond the break. In case the resistance is open, the telephone signaling currents may cause a chattering of the relay.

Trouble at telephone stations may be traced to a ground across the protector blocks, to a loose or open connection between the telephone set and telegraph line, such as an open fuse; to defects in the apparatus or wiring of the signaling circuit in the set (represented by the light lines in Fig. 3) to defects in the apparatus or wiring of the talking circuit in the set (represented by the heavy lines in Fig. 3); or to an open ground connection.

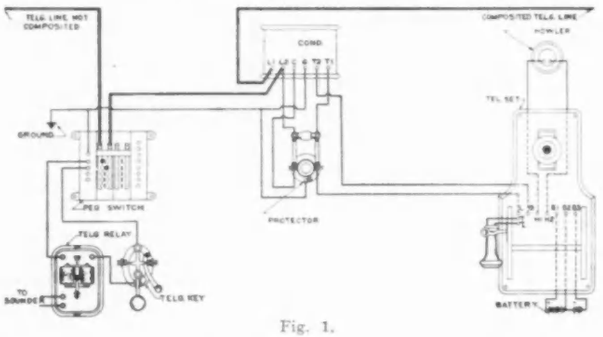


Fig. 1.

Such troubles will not ordinarily interfere with the continued operation of the telegraph apparatus, but in any case, the following tests and remedies should quickly locate and remedy the defects and place the system in operation.

When able to talk satisfactorily over a line but unable to signal other stations, it is well first to ascertain whether the interrupter operates when the signaling key is depressed. If it does not, test the battery, and if that is all right, try a different adjustment of the contact screw on the interrupter.

If the interrupter operates satisfactorily and it is impossible to signal other stations, ascertain whether signaling current is delivered to the line when the key is depressed. This may be determined by replacing the receiver on the hook and disconnecting the line wire from terminal "L," Fig. 1, short-circuiting the terminals "L" and "H 2," and then pressing the signaling key, which should operate the howler at the home station.

If the local howler does not then operate, it indicates that the trouble is in the telephone set at this station, and that the contacts of the switch hook and of the signaling key should be examined to see that they make good contact with each other. If this does not clear the trouble, it is advisable to look for an exhausted battery, loose connections, broken wires, or an open in the condenser.

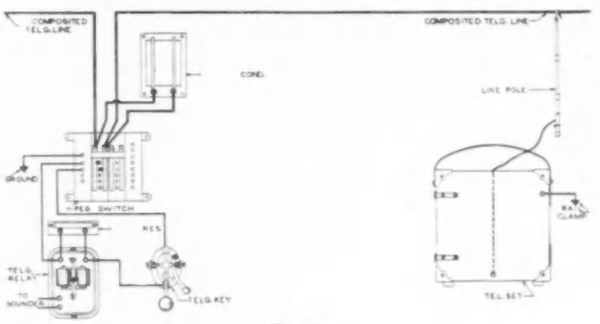


Fig. 2.

An exhausted battery can be detected by bridging a low-reading voltmeter or battery gauge across each of the signaling cells of the telephone set while the switch hook is in the proper position for talking and the signaling key closed for one minute. If the cells are not exhausted, the total pressure under normal working conditions should be at least 0.7 volt per cell. Loose connections or broken wires can readily be found by inspection. To test for an open in the condenser, short-circuit its terminals; if the howler then operates it indicates a defective condenser.

If the howler at the signal station operates satisfactorily after disconnecting the line wire and short-circuiting terminals "L" and "H 2," it indicates that the trouble is not in the telephone set. It may, however, be due to arcing at the open space cut-outs in the signaling station, or to trouble at the receiving station where the howler may be out of adjustment or open, the condenser defective, or to an open circuit in the wiring. The removal of the copper blocks in the open space cut-outs at the signaling station will, therefore, determine at this stage in the tests whether the trouble is in the distant station.

At the receiving station, the method of procedure would be as follows: The terminal "L," Fig 1, should be connected to "H 1." If the howler then operates, it indicates an open in the condenser. If however, the howler does not operate, the next step would be to test the howler separately. This is done by connecting it directly to one battery cell and listening for a click at the instant the circuit thus formed is closed. If no click is heard, the trouble is in the howler; otherwise, it must be an open circuit in the wiring.

The sound emitted by the howler can be varied by moving the diaphragm nearer to or further away from

*Adapted from instructions arranged and copyrighted by the Western Electric Company.

the magnets. One method of adjusting the howler is to have the most distant station keep signaling current on the line until the shell containing the diaphragm has been adjusted to give the desired tone; the locking ring may then be used to fix the shell firmly in place. As the locking of the metal shell in place tends to move the shell slightly away from the magnet, due allowance should be made in adjusting the howler to guard against this action throwing the howler out of adjustment.

It sometimes happens that the magnets in the howler become demagnetized or weakened after being in service for a long time. In this case, the howler should be replaced by a new one and the defective howler returned for repairs.

If the transmission is poor, that is, if there is trouble in receiving messages at a distant station while messages are clearly received at the home station, the speaker should talk clearly, with his lips close to the mouthpiece of the transmitter. If the transmission is still unsatisfactory, the trouble may be an open in a condenser at an intermediate telegraph station; in the primary or secondary of the talking circuit in the sending station (see heavy line circuit in Fig. 3); or in the secondary (receiving) circuit of the receiving station (see heavy line circuit in Fig. 3).

If in the condenser at an intermediate telegraph

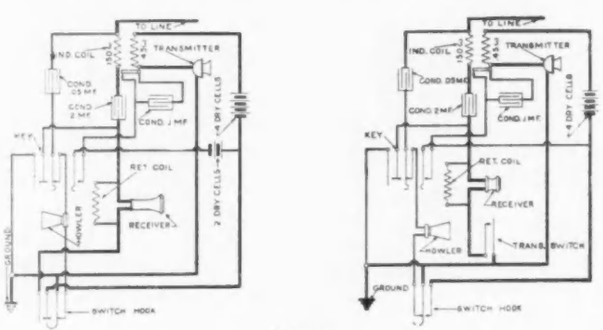


Fig. 3.

station, the trouble is undoubtedly an open, which, although interfering with the transmission of the voice beyond the break, will not interfere with its reaching a station on the same side of the break as the sending station. If in the primary or the secondary of the talking circuit in the sending station, the receiving station will have no trouble in hearing messages transmitted to it from other stations on the line. On the other hand, if the trouble is in the secondary (receiving) circuit of the receiving station, the sending station will have no trouble in transmitting to other stations.

To test for trouble in the talking circuit of the sending station, place the receiver to the ear, and if the secondary circuit is not open and there be no defective apparatus in it, the usual low sounds characteristic of aerial lines, will be heard. These sounds vary in intensity other electric circuits, but they are seldom of sufficient intensity to interfere with the telephonic transmission. If the secondary circuit is thus found to be all right, the primary circuit is then tested by listening in the receiver while speaking into the transmitter or tapping it gently. These sounds will be distinctly heard in the receiver if the primary circuit is in good working order, or a click will be heard in the receiver when the switch hook is operated. If such sounds are not heard, the apparatus and wiring in the secondary circuit, should be examined, and the battery inspected for an open circuit.

A battery test with an ammeter is here recommended. This test is made by connecting the ammeter in the primary circuit, and after the receiver has been off the switch hook for one minute, noting the current in the ammeter. If the battery is working perfectly, it should give a current of more than 0.14 ampere after it has been thus connected for one minute. This corresponds to a voltage of approximately 2.8 across the terminals of the talking battery while the latter is under load, that is, furnishing current to the primary circuit.

If the condensers on the line are not defective, and there be no trouble in the talking circuit, it is in all probability in the receiving circuit at the distant station.

If unable to hear distinctly, and there is no difficulty in transmitting messages, either in the local or the distant station, it indicates trouble in the secondary circuit of the telephone set. A thorough inspection should be made of all parts of this circuit for poor connections, and if none be found, an examination should be made of the apparatus in the secondary circuit for defects and poor adjustments.

Retardation coils in regular telephone sets frequently have an iron core which can be moved in or out and secured in any position to vary the impedance and regulate the amount of current shunted around the receiver. If disturbing noises become troublesome in the receiver, the iron core should be moved out of the retardation coil to reduce the impedance of the coil and permit more current to pass around the receiver. On the other hand, to maintain the volume of the sounds received, the amount of current diverted from the receiver should be as small as consistent with the necessary freedom from the disturbing noises. The core should therefore be withdrawn from the coil no further than is necessary to obtain the desired result.

In portable telephone sets the iron core is usually permanently adjusted in the retardation coil, because the disturbing noises vary at different points along the telegraph line, and owing to the temporary use of the set, do not warrant readjusting the core every time the set is put in service at a different point.

In case the trouble cannot be remedied by means of the retardation coil, it may be found in the receiver itself. Trouble in receivers may be caused by dust or dirt settling upon the pole faces of the magnet and damping the vibrations of the diaphragm. To clear this trouble, the receiver cap should be unscrewed and the pole faces of the magnet wiped perfectly clean.

Buckled diaphragms are sometimes a cause of trouble in telephone receivers. The buckling is generally caused by pencil points or other sharp objects being pushed against the diaphragm and denting it. When a diaphragm has thus been injured, it should be replaced by a new one. Occasionally, weakened receiver magnets are a source of trouble. If they are not sufficiently strong to hold the diaphragm to them when the receiver cap is removed and the receiver given a vigorous shaking in the direction of its length, a new receiver is necessary.

The reciver cord will in time become worn or possibly injured so as to cause trouble by opening the circuit either intermittently or permanently. As the wire strands within the cord may be broken without the appearance of the cord betraying it, this trouble is difficult to locate without tests. If the wires in the receiver cord be broken so as to open the receiver circuit, or if the winding of the

coils in the receiver be open, no sound will be heard in the receiver.

A good method of testing a receiver and its cords for an open circuit, is first to connect the leads from one battery cell directly to the receiver terminals. If the receiver does not give an audible click at the instant this circuit is completed, and the diaphragm is in proper position, it may be safely assumed that the wiring in the receiver is open and will have to be repaired. If the click is heard, the receiver is all right. Then the cords should be tested by connecting them to the receiver and repeating the test, a click in the receiver upon connecting the battery to the cords indicating no break in them, and the absence of the click indicating that there is a break. A worn cord that is breaking the circuit intermittently might not be detected by such a test, but if the cord be bent or shaken while the receiver is held to the ear, a scraping sound will be heard whenever the cord is bent so as to open the circuit.

Ground troubles may be due to foreign matter between the blocks of the protector, to a defective condenser or to a cross between the primary and secondary parts of the talking circuit. To determine if the trouble is in the protector, remove the metal cap and pull out both of the protector blocks. If this clears the ground, they should be cleaned and replaced, and, if necessary, new micas should be used in place of the old ones. Under no circumstances should cardboard or paper be substituted for the mica. If the trouble is not in the protector, and the separation of the line wire from the protector or telephone sets clears the ground, the condensers and wiring in the telephone set should next be tested.

In case either condenser be found defective, any available condenser which will clear the trouble temporarily may be inserted between the telegraph line and the telephone set until the defective condenser is replaced. If no suitable condenser is at hand, disconnect the telephone from the line until repairs can be made.

In a terminal station, a ground may occur, due to a short circuit in the condenser. To determine whether this is the trouble, remove the ground wire from that equipment; if the trouble then ceases, it indicates that the condenser is defective. To clear the trouble temporarily, the ground connection may be left off the condenser. In doing this, however, the ground connection of the telephone set, which is usually made at this point, must not be disturbed, as this would leave the telephone out of service.

Frisco Extends Telephone Dispatching System

The St. Louis and San Francisco Railroad, which has been active in the campaign among the railroad systems of the country to supplant the use of telegraph with the telephone for train dispatching, is now installing new telephone circuits over about 500 miles of its line. The circuits now in course of construction extend from St. Louis to Springfield, Mo.; from Springfield to Thayer, Mo., and from Amory, Miss., to Birmingham, Ala.

Trains on the Frisco are now being dispatched by telephone between Kansas City, Mo., and Springfield on the Northern Division, and on the Lebanon Division between Springfield and Monett, Mo., a total distance of about 246 miles. This part of the Frisco is single track, and the traffic between Kansas City and Fort Scott is unusually heavy.

The fact that the telephone dispatching circuit in this busy district has proved satisfactory to the operating officials through the service it has given influenced their decision to extend this form of dispatching over more territory.

The equipment which is now in service and that which is soon to be installed consists of telephone apparatus and selectors purchased from the Western Electric Company. Message circuits, on which the commercial business is handled, parallel in every case the dispatching circuits, which are used exclusively to direct train movement and traffic.

Vermont Commission News

A hearing upon the status of telephone and other wires in the cities of Barre and Montpelier was recently held by the Public Service Commission of Vermont. The following companies were represented: the Consolidated Lighting Company by Jas. E. Davidson; the Moody and Almon Company by W. N. Theriault; the Orange County Telephone Company by J. H. Senter; the Barre and Montpelier Traction Company by W. A. Lord, and the New England Telephone and Telegraph Company by its counsel, M. Jones. After considerable discussion it was agreed that in case of extension of service of any company which makes necessary changes in the construction of pole lines, the entire cost of making the changes in accordance with the specifications shall be borne by the company desiring such changes or additions.

Provision was made for fire-alarm wires by reserving the top cross-arms of the poles for this purpose, allowing for mutual arrangement to be made in case it is desirable to have wires lower down. The city has the right to use one duct in whatever conduit construction the telephone companies undertake. The agreement also provides that should conditions render it necessary to make changes or amendments in the specifications for doing pole line work, such changes shall be agreed to by all parties, subject to the decision of the commission in case of disagreement.

Considerable discussion regarding the amount of work to be undertaken by the companies during the present toward making the contemplated changes resulted in no definite conclusion. However the case was taken under advisement by the board and an order will be issued as to the amount of work which it deems necessary to be done during the year. C. D. W. Jarvis, of the New England Telephone and Telegraph Company's engineering department at Boston, was chosen to supervise the work.

Automatic-Ringing Patent Decision

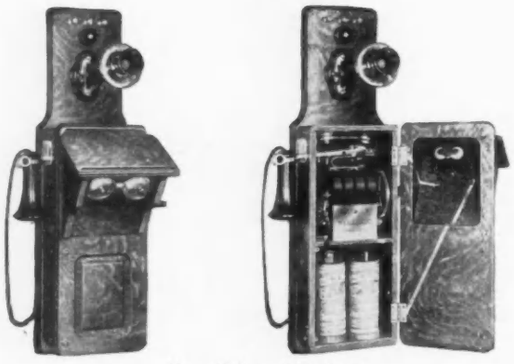
A decision was recently rendered by the United States Circuit Court for the Eastern District of Missouri, dismissing the bill in the case of Angus S. Hibbard, complainant, against the Kinloch Telephone Company of St. Louis. It was alleged that the Kinloch company had infringed claims Nos. 7 and 8 on United States patent No. 542,052 for an automatic-ringing system, which had been granted Mr. Hibbard. Messrs. Brown and Williams, counsel for defendant, contended that unless limited to the specific details set forth in the Hibbard patent in suit, the claims are anticipated by the prior act, and particularly by the Van Orth patent. The independent telephone interests consider the decision a victory.

Of Interest to the Trade

Kellogg's C. B. Type Magneto Telephone

This new type of telephone is designed to combine the symmetrical outline and compactness of the common battery instrument with the simplicity and accessibility of the standard wall telephone. The practical features of the new cabinet will appeal to operators. Subscribers generally like the common battery style telephone. It occupies no more space than other styles and the transmitter arm does not project so far beyond the cabinet as in the standard compact set.

A glance at the accompanying illustrations taken from



New Kellogg Telephone.

a stock telephone emphasizes the force of these advantages. They show the attractive finish of the Kellogg cabinet as well as the practical arrangement of each part. Most of these types of telephones heretofore on the market are built with two or more sets of lids or sliding panels, which add to weight and complicate handling. With the new set there are but three units to the cabinet; the backboard, the box and the lid.

This telephone is made of the best quality throughout; but standard Kellogg parts are identical with the equipment of the regular magneto telephone.

The upper part of the backboard is shaped similar to the c. b. type, while the lower two-thirds widens to fit the box, built just as the regular compact type but smaller. The generator shelf, fastening of hookswitch, coil and battery space is the same as the regular set. The writing shelf to this telephone is placed at top of box lid and the ringer is set under the shelf which affords protection to the coil end of ringer, when door is open, yet is just as accessible as in the regular telephone. The dimensions are: length of backboard, 28 inches; width, 8 inches at widest part; 6½ inches at top. Width of box, 7⅛ inches; depth of telephone from backboard to shelf, 9¾ inches; depth of box alone 3 inches. Depth of shelf, 5¼ inches. Extension of transmitter arm, from backboard to mouthpiece, 9⅝ inches.

A Book for Amateurs

Dynamo Building for Amateurs is a little volume devoted to the construction of a fifty watt dynamo for the use of amateur electricians. The author, Arthur J. Weed, has designed the little machine which is described so that all necessary work may be done on a foot-power lathe with a six-inch swing. Sixty-four engravings illustrate the eighty-four pages of the book, including working drawings to scale, and views of each process of winding, etc., as the work progresses.

The finished machine is very neat in appearance, and should be quite efficient; and the directions for work upon it are exceptionally thorough and detailed. Even the veriest novice could hardly fail in following the work to successful completion, and every amateur experimenter desires to construct a dynamo. The fact that the field magnet is made up of special punchings which may be obtained of a concern whose advertisement is carried in the back of the book is rather a reflection upon the work as a text-book; but so far as making it objectionable to the amateur, it will probably be a recommendation, as one of the difficulties of small machine construction is obtaining the parts readily.

The Norman W. Henley Publishing Company, New York. Cloth, $1.00, paper 50 cents.

New Conduit For Underground Cables

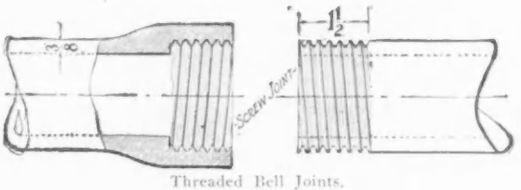
A new cable conduit recently placed on the market by the H. W. Johns-Manville Company, known as the "J-M" fibre conduit, is especially noteworthy because of some features new in the manufacture of conduits.

This conduit is made of indurated fibre, a material which has been used very extensively for insulating purposes, such as third-rail coverings, controller linings, battery boxes, etc. Water pails have also been made of it for many years.

The New J-M Fibre Conduit.

In making the J-M fibre conduit, the fibre is moulded into shape under high temperature and immense pressure, and is entirely without grain or laminations. This process gives each length of conduit a solid, ⅜-inch one-piece wall, homogeneous with tensile strength that is remarkable when compared with the light weight of the conduit.

But the most interesting feature of this new conduit lies in the bell joints shown here. One end of each



Threaded Bell Joints.

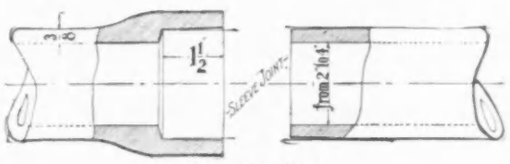
section is molded to an enlarged size—belled out—with an opening as large as the outside diameter of the opposite end of the next section. Thus, any two sections fit together without any reduction in the wall thickness of either section at the joint. This makes a stronger and more rigid connection than is possible with any other kind of joint.

Realizing, however, that installation methods on

some systems have been devised which necessitate the use of straight joints, the manufacturers have also arranged to make this new conduit with straight line joints, as shown.

The joints in this new conduit are perfectly smooth inside—they are machine molded and perfectly true, with no offset. Each length of the conduit is also smooth throughout its bore. This greatly facilitates the work of inserting cables.

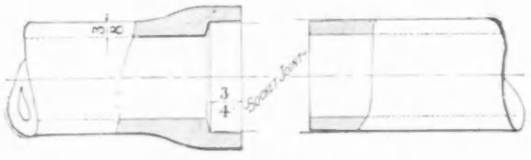
The manufacturers claim that by reason of there be-



Sleeve Bell Joint.

ing no seams or roughness at the joints of this conduit, and as the air-tight joints prevent particles of concrete from seeping through, a No. 6 wire can be pushed through each duct, from manhole to manhole, doing away with the ropes and rods so necessary with ordinary conduits.

Moreover, the smooth, tight joints and the smooth bore of this conduit should add greatly to the life of the cable, for the seams or raw edges at joints, burns, blisters, lumps, etc., are ordinarily the greatest cause of cable

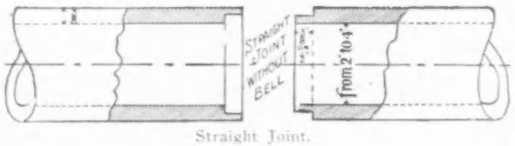


Socket Joint.

trouble, as they injure or abrade the lead casing of cable when it is being drawn through the duct.

Tests made of this conduit, with 3/8-inch thickness of wall, show that it has an average puncture voltage of 40,800 dry and 33,000 volts after 40 hours immersion in water. Danger of electrolysis should therefore be practically eliminated by the use of this conduit.

In weight, this conduit has an advantage over those made of stoneware, etc., as it weighs only about one-sixth as much. This makes it easier to handle. The light



Straight Joint.

weight also cuts down the freight charges. Breakage is also reduced to a minimum by reason of the great tensile strength of its walls.

A variety of fittings, such as bends, elbows, tees, etc., provide for bends and curves in the trenches. Two three and four-way junction boxes provide for branch and service connections.

A very attractive booklet has been gotten out by the manufacturers, and a copy can, no doubt, be obtained by writing to the company at New York.

A Convention Exhibit Worth While

Following its usual custom the Kellogg Switchboard and Supply Company provided exceptionally fine and instructive exhibits at the recent Kansas and Missouri conventions held at Topeka and St. Joseph.

The same exhibit apparatus was used at both conventions and an unusually large number of interesting features were shown. Altogether the exhibit contained three switchboards and a thoroughly representative assortment of telephones and smaller apparatus. A 200-line, two-position magneto board fully equipped with line and cord and transfer circuits together with calling and disconnect pilot lamps showed the perfection to which magneto equipment has been brought by the Kellogg company. The cord circuits in this board were all of the improved double supervisory non-interfering type described in Kellogg Bulletin No. 32. It was shown that these cord circuits not only insure the absolute operation of ring-off drops, but that with them it is impossible for any party on any line to ring through the board and falsely disturb the bell of any party on any connected line.

Another feature of great interest was the demonstration of the Kellogg company's new four and eight-party harmonic ringing apparatus for magneto exchanges. This system operates from dry batteries without transformers, the only expense for central office equipment being a master key in each operator's position and an inexpensive, four frequency wall mounting interrupter unit at the central office. The telephones used on this system can be any form of magneto instruments fitted with harmonic ringers. No condensers are required in the telephones, neither is it necessary to have direct current generators or other special features. The switchboard drop can be any resistance from 100 ohms up. The demonstration of this apparatus was most thorough and rigid and necessarily convincing. One of the four telephones had purposely been equipped with a 5-bar A.C. generator to demonstrate the impossibility of tapping any bells when calling central or ringing off. An artificial condition had also been set up for demonstrating the absence of induction on parallel grounded lines when ringing even with the 66 cycle current. This condition was also used to demonstrate the fierce induction that has brought some selective equipment into disrepute. The four frequency interrupter unit was shown to operate absolutely sparkless under all conditions, insuring indefinitely long life to the heavy platinum contacts with which the apparatus is provided. The flashing and rapid contact deterioration of other systems was demonstrated in connection with the inductive disturbances on parallel lines, from all of which bad features the Kellogg system was shown to be wholly free.

A fifty line lamp signal private branch hotel switchboard was shown arranged with simultaneous loud ringing and common talking keys for use in case of fire. This board was also arranged so that all incoming calls can be answered by means of the common answering key without touching any plugs and cords. A desk set on the hotel counter enables the night clerk to answer incoming calls without going to the board, the switch-hook in the desk set comprising in this case the common answering key. The popularity of this common sense arrangement can be readily appreciated since experience shows that over 95 per cent of all calls from hotel rooms do not result in completed connections and in such cases it is only necessary for the guest to state his wants since the line

lamp reveals his identity. This common answering circuit will no doubt find a wider application than hotel use.

At the Topeka convention the greatest interest was manifested in the hundred-line magneto board that has been in continuous service for five years and ten months. A placard announced the fact that this board had been used for this length of time at Jamestown, Kans., also that it contained not an inch of new wiring and no new apparatus, except a new set of jack thimbles, all other apparatus having been used the entire six-year period, except the cords, which were three years old. Liquid veneer had been used in cleaning up the cabinet and the wiring had been freshly shellaced. The almost new appearance of this board and its perfect working condition after six years of wear and tear deeply impressed on all the remarkable stability and wearing qualities of the Kellogg equipment. This is the first instance on record where a manufacturer has made an old switchboard a feature of his convention exhibit.

Great interest was manifested in the recent improvements in detail, including the rubber incased steel mouthpieces (not enameled steel) and reinforced receiver shells. Visitors to both convention freely expressed their appreciation of the comprehensive and instructive exhibits and backed up such appreciation with a liberal number of orders. Both exhibits were designed by and in charge of Harry N. Faris, manager of the Kansas City office. He was ably assisted at Topeka by Herbert Clark, M. A. White and A. E. Weber of the Kansas City office, and also by G. A. Joy, sales engineer. At St. Joseph Mr. Faris was assisted by J. C. Kelsey, general sales manager, and Messrs. White, Foote, Hind and Boze. The Kellogg company believes in making convention exhibits interesting and instructive and "worth while" and such exhibits as these should be a powerful incentive to a good attendance on the part of managers desiring to keep up to date.

New Feature of "Chicago Grip"

Attention is called by the manufacturers, Nathias Klein & Sons, to a new feature in the "Chicago Grip." There has been, for a long time, a demand for a grip to handle No. 10 insulated wire, and of the various grips on the market none was entirely satisfactory for handling insulated wire. Chicago grips for the larger sizes, from No. 4 to No. 4-0 have been on the market for some time, but none for No. 10 wire. The peculiar feature of this grip is the construction of the upper or sliding jaw. It is divided, into intermittent flat spaces and transverse grooves. The effect on the wire is such that the pressure due to the pull causes a slight depression in the insulation where in contact with the flat spaces, and presses it slightly into the transverse grooves, just sufficient to grip tightly and prevent slipping without injuring the insulation in the least. The lower jaw is simply provided with a longitudinal groove, having a nextension lip along its side as a firm support around a large part of the body of the wire. It is said by users of this grip that it is giving entire satisfaction, and the manufacturers say they are receiving many repeat orders. This may be considered good evidence of the practical merit of the grip.

A noteworthy feature in all of the Chicago grips is the arrangement of the drawlink in a way that it does not hang down at right angles, and therefore is not in the way of the line wire when the grip is put on. The loop never drops below the horizontal position, but is free to move upward. This feature is appreciated when it is necessary to reach far out on the wire to put on the grip in pulling in slack.

Farr Bridging Mine Telephones

The Farr bridging waterproof mine telephone has the entire mechanism inclosed in a cast-iron box, which is arranged with a gasket on the door, making it entirely water and moisture proof. It has a special locking handle of brass, which is arranged to draw the door down tight to the gasket to prevent water seeping through. The bells are placed on the bottom or underneath the telephone, and are protected with a sheet metal cover, but arranged with openings so that the sound can get out, but still not let any water into the instrument.

The receiver, transmitter, induction coil and switchhook are mounted on a hinged panel of maple, which has been boiled in paraffine so that it will not absorb moisture or become affected by the various mine conditions. By removing one screw this hinged panel may be swung open to get at the batteries or for inspection of any of the parts. Each and every part is mounted so that it is accessible at any and all times.

The Farr Mine Bell.

A special heavy generator is used and the ringers are wound regularly to 1,600 ohms, although other resistances can be furnished. A fuse and carbon arrestor are mounted on the inside of each instrument. All windings are boiled in paraffine to prevent their taking moisture.

The case is arranged so that it can be fastened with two lag screws to either a flat surface or a round supporting timber.

Electric Storage Battery in Detroit and Denver

The Electric Storage Battery Company announces that it has just opened two new sales offices, one located at 729 Ford building, Detroit, Mich., and another at 1424 Wazee street, Denver, Colo.

The increasing use of the "Chloride accumulator" and "Tudor accumulator" for central stations, telephones, railways, and an enormous increase in the use of the "Exide" battery for electric vehicles, gas engine ignition, etc., has made it advisable to establish these offices, so that customers in adjacent territory will be better served. A stock of battery material will be carried in Denver from which orders can be promptly filled.

The addition of these offices, as well as the St. Louis "Exide" storeroom recently opened at Sixteenth and Pine streets, very materially increases the facilities of this company in the west.

Western Electric Signaling System for Mines

The Western Electric Company announces that it is prepared to furnish a new design of emergency signaling apparatus for mines which complies fully with the laws of Illinois and other states regulating the use of telephones and emergency signaling systems in mines.

The new signaling system consists of a generator signaling set and the regulation emergency eight-inch

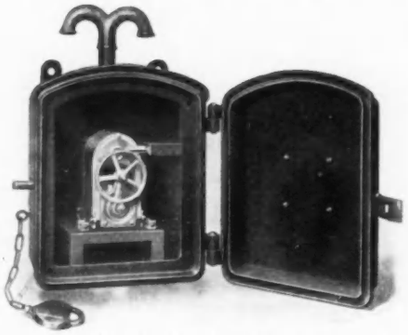


Fig. 1. Showing Generator.

signal bells or gongs. The generators used in the signaling sets are designed in two sizes to accommodate systems which require a large or small equipment of gongs.

The smaller of the two generator equipments consists of a five-bar magnet generator mounted in an iron case, as shown in Fig. 1. In appearance this case is similar to that of the new mine telephone set which this company placed on the market a few months ago. This five-bar generator will operate the equivalent of twenty eight-inch, loud-ringing extension bells over eight miles of

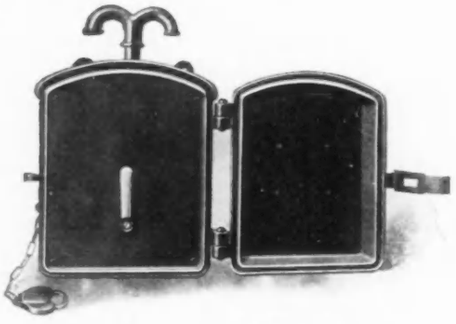


Fig. 2. Box Open, Showing Steel Cover.

full metallic No. 12 B. W. G. iron wire. The magnets of the generator are of the highest grade magnet steel and are hardened and aged to insure retaining their strength indefinitely. The bearings are large and well proportioned and the crank furnished is of a design which enables the generator to be rung easily when fully loaded.

The larger signaling set consists of a fourteen-bar magnet generator mounted in a metal case similar to that of the five-bar magnet equipment and is similar to that equipment in every detail except size. This generator will ring the equivalent of sixty eight-inch gong emergency bells over an eight-mile line.

In each of these types the generator is arranged in an iron box provided with a padlock, ordinarily to be kept locked. To protect the generator when the outer door of the box is opened, a steel cover is fastened over the opening of the box and in front of the generator. This cover removes the possibility of any part of the clothing of the party operating the generator being caught in the generator wheels and also protects the generator from interference by other foreign substances which might collect should it be exposed while the door is open.

A compartment in the front of the door of the box equipped with a glass front is provided for the key to the set. It is the intention that a key to the set shall always be kept in this compartment and that this key will be used only in cases of emergency, when anyone may break the glass front and obtain the key to open the set. This compartment is to be made air-tight so that it will be impossible for dust to get inside and hide the key from view. The back of this compartment is to be painted white so as to make the key more noticeable.

It is also intended that the foreman or man in charge of the mine shall be provided with an extra key to enable him to open the box under ordinary conditions

Fig. 3. Locked Box, Showing Key in Glass Pocket.

in the mine when it is desirable to operate the generator for fire or emergency call drill.

The same precaution against water following the line wires into the case of the signaling set is taken as in the Western Electric new design of mine telephone. The curved inlet at the top provides an entrance which removes the possibility of water flowing along the line wires and into the set.

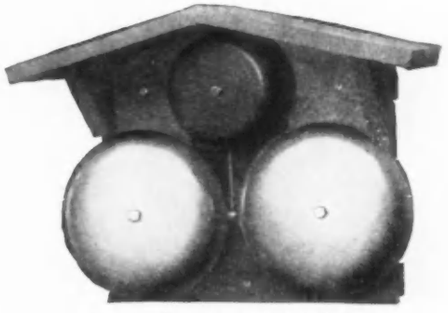


Fig. 4. Emergency Signal Bell.

The emergency signal bell used with the generators consists of a non-sparking bell provided with two eight-inch steel gongs mounted upon a wooden or steel backboard and having a protecting canopy. The gongs are hot galvanized and have an especially loud and clear tone. All parts, including the windings, are specially treated to stand conditions of mining atmosphere.

The signal system above described may be used with or independent of a telephone system. For mine tele-

phone service the Western Electric Company has new designs of metal and wood sets and also a new design of an intercommunicating metal mine set, all of which are fully up to the standard of the telephone apparatus furnished to regular telephone companies.

Illustrations of New Kellogg Mouthpiece

Two views of the new Kellogg transmitter mouthpiece are shown herewith which bring out the novel features of the part and emphasize the fact that the Kellogg company is prominent in the production of reliable up-to-date apparatus.

The new Kellogg mouthpiece has a strong steel base.

Fig. 1.

This pressed steel form is perforated with two rows of holes and placed in a mold fitted with rubber composition.

This mould forces the rubber into shape on the steel form under great pressure, which forces the rubber insulation into the holes in the metal. This process insures the rubber from chipping or cracking on the metal.

Figure 1 illustrates a part of the rubber insulation

Fig. 2.

removed to show the two rows of perforations in the metal. Figure 2 is a cross section view of mouthpiece showing outline of steel form and the inner and outer shells of rubber.

This mouthpiece does away entirely with the constant breakage expense of the old style, yet is a perfect insulator, doing away with any damage from shock due to crossed wires.

The Gray Telephone Pay Station Company has brought out a new booklet descriptive of Gray registers for measured telephone service. Some very interesting comparisons and arguments are presented.

Western Electric Switchboards Popular

From personal observations and from reports received from various manufacturers, it is evident that the year 1910 is going to hold a prominent place in the history of telephone development.

When the Western Electric Company disposed of

Old Power Apparatus Shop, now Switchboard Room.

its power apparatus manufacturing business last fall, the statement was made that its large power apparatus shops would be needed to take care of the increasing telephone business. That this prediction has come true, and probably sooner than was expected, is illustrated by the accompanying cuts showing the main floor of the old power apparatus shop, which is 885 feet long and 165 feet wide, filled with telephone switchboards in the process of assembly. The original switchboard

Switchboard Assembling Department.

plant, which is even larger than this addition, is reported just as busy.

The enormous capacity of the Western Electric Company's enlarged switchboard plant is perhaps best evidenced by the statement that over 2,000 sections of switchboards have been turned out within the past fifty days, and the orders booked for the next few months will require an even larger output.

American Fuse Issues New Bulletin

The American Electric Fuse Company has headed its new bulletin No. 325 "Cheap Fuses That Are Good—the American Kind." This bulletin treats in detail the advantages of the American Electric Fuse product in telephone protection, and illustrates the company's manufacturing facilities with views showing the receipt of an order and tracing it to the shipping room.

Since the American Electric Fuse Company started making mica fuses, it has manufactured over one-quarter of a billion, which figure indicates the output from only one branch of the factory. Inquiries for any of the company's bulletins will be promptly attended to.

Convertible Switchboards

A convertible switchboard is one which can be converted from magneto to central energy, or vice versa, without installing any new apparatus. This change may affect the whole board, or may be made one line at a time. The Western Electric Company produces such a board, in which, in order to change any one line from magneto to central battery, it is only necessary to change certain strap wires on the rear of the apparatus, the line circuit apparatus itself remaining unchanged.

Holtzer-Cabot's New Chicago Building

The Holtzer-Cabot Electric Company has removed its Chicago offices from 397 Dearborn street to its own new building at 6161-6165 State street. The new location is extremely convenient, being within a few hundred feet of the Englewood station of the Rock Island, Lake Shore and Pennsylvania railroads and the south side elevated railroad, while the State street surface cars pass the door. The company's Chicago stock will be increased, its repair department enlarged, and every facility for prompt and efficient service provided in the new quarters.

Western Electric Desk Stands

The manufacturer of desk stands by the Western Electric Company has covered an experience of over thirty years, and in their present improved form they possess high efficiency, extreme compactness and attractive appearance.

So popular has the No. 20 type stand become that the demand for the past few months has been running at a rate of more than 500,000 per year, and the Western Electric Company's capacity has been taxed to the limit to keep ahead of orders, about one-half of which call for stands with the black gun metal finish.

Readers of TELEPHONE ENGINEER who are interested in the article in this number entitled "A New Method of Fault Location," by H. Louis Hoffman, will be glad to know that the sale of the valuable device described, known as the "Telefault," has been taken up by W. M. Matthews & Brother of St. Louis. Further information as to price, etc., can be obtained from them.

Brevities of the Business

PERSONAL NOTES.

Holmes A. Shepard has resigned his position with TELEPHONE ENGINEER to assume the responsibilities of purchasing agent for the L. M. Ericsson Telephone Manufacturing Company, Buffalo, New, York. He will take charge of his new and important post June 1. Mr. Shepard is one of those keen, bright, energetic young men who has profited by the splendid advantages offered by the cities of this country. He finished his schooling with a four year's electrical engineering course in Lewis Institute of Technology. He has had shop experience in the telephone factories of the Western Electric and Kellogg Switchboard & Supply Companys, coming to the advertising department of TELELPHONE ENGINEER from the latter company, where he was assistant purchasing agent. His training and experience fit him admirably for the place he is taking and we are confident his new associates will find him well qualified in all respects.

R. L. Bayne, who for four years was connected with the firm of Valentine-Clark Company, has been appointed Eastern sales manager for Lindsley Bros. Company, whose home office is at Spokane, Wash. Mr. Bayne succeeds G. L. Lindsley, a well-known man among cedarmen, and is located at the same Chicago address, 1261 Monadnock Block. Lindsley Bros. Company sell western cedar only, and to take care of the Northern pole business, Mr. Bayne is also handling the sales for G. L. Lindsley Lumber Company, in which he is financially interested. Mr. Bayne is one of the younger men in the cedar pole business, and has a prosperous future before him.

Dr. Morton G. Lloyd, Washington, D. C., a well-known authority on electrical and kindred scientific subjects, recently assumed the position of technical editor of the *Electrical Review and Western Electrician*. Both in scholarly attainment and in training Dr. Lloyd is well fitted for this work and will make a valuable accession to the field of technical journalism.

J. F. Harrell, general manger of the Interstate Telephone Company, Aurora, Ill., recently resigned his position and his duties will be assumed by President H. H. Evans until the company holds its annual meeting, which will not be until December.

J. F. Bratney, chief engineer of Missouri, has resigned to accept an executive position with the Missouri-Kansas Bell Telephone Company, with headquarters in Kansas City. Mr. Bratney has been connected with the Bell Company in St. Louis for the last seven years, during which time he has held several important positions. He is president of the Bell Telephone Society of St. Louis and a member of the Board of Managers of the Association of Engineering Societies, Executive Committee of the St. Louis section of Electrical Engineers and Membership Committee of the Civic League. TELEPHONE ENGINEER takes pleasure in numbering Mr. Bratney among its readers and wishes him success in his new field.

George C. Kirkham, for the past two years and a half manager of the Southern New England Telephone Company's exchange at Ansonia, Conn., has been promoted to the position of manager of the Waterbury district, one of the six first-class exchanges in the state. Mr. Kirkham has been connected with the company for a number of years and is looked upon as one of the best informed men in telephone matters in the state. He will be succeeded by A. H. Stevens of New Haven.

C. F. Hixon has been appointed manager of the Interstate Telephone Company's exchange at Peoria, Ill., to succeed W. G. Olwin, who has resigned to take up another line of work.

Charles Guernsey, formerly manager of the Scott County Telephone Company, Scottsburg, Ind., has assumed the management of the Eden Mutual Telephone Company at Schaller, Iowa.

J. S. Wiley has been appointed comptroller of the American

Telephone and Telegraph Company, with headquarters at New York City. Mr. Wiley has been succeeded as auditor of the Bell Telephone Company of Philadelphia, Pa., by Martin H. Bushler, manager of the Pittsburg exchange of the Bell company.

F. L. Gilman, until recently assistant to H. B. Thayer, vice president of the American Telephone and Telegraph Company, in the work of reorganization and management of operating companies, has been elected vice president and general manager of the Missouri Bell Telephone Company and the Missouri and Kansas Telephone Company, with headquarters at Kansas City. For four years Mr. Gilman held a responsible position connected with engineering and superintendency of the factory of the Western Electric Company, New York. He will have charge of the Bell plants in the states of Missouri and Kansas.

T. T. Ramsdell, formerly president of the Bell Telephone Company of Buffalo, has taken a position on the staff of the New York Telephone Company, which has been consolidated with the former company.

H. H. Brown, Beaumont, Tex., has been appointed manager of the Southwestern Telegraph and Telephone Company, Houston, Tex., to succeed E. G. Evans, resigned.

F. W. Morris, superintendent of construction of the Bell Telephone Company of Missouri, has been appointed acting superintendent of plant to succeed to the duties of F. R. Mott, resigned.

S. I. Rutledge, who has had charge of the Iowa Telephone Company's exchange at Burlington, Iowa, has been transferred to that company's exchange at Des Moines.

J. B. Walker has accepted the position of wire chief for the Beloit Telephone Company, Beloit, Kans. Mr. Walker formerly held the same position with the Wichita Telephone Company, Wichita, Kans.

H. B. Falgatter, a thoroughly experienced and capable telephone man, who has been connected with the telephone industry for over twelve years, recently purchased the Independent Telephone Company of Oakley.

Elmer Sapp has been elected president of the Bureau County Independent Telephone Company, Princeton, Ill.

CONVENTIONS.

At a preliminary meeting held at Mt. Vernon, Ky., of which Charles A. Chandler, London, Ky., and James Maret, Mt. Vernon, Ky., were chairman and secretary respectively, it was decided to hold a convention of the independent interests of Southeastern Kentucky and Eastern Tennessee, at Middlesboro, Ky., June 3, the purpose of the convention being to consider the telephone situation in that district generally with a view to forming an association covering the eastern section of the two states mentioned.

The North Dakota Independent Telephone Association will hold its fifth annual convention at Minot, N. D., July 18, 19 and 20. No effort has been spared on the part of those having the matter in charge to make it the most successful convention yet held. A larger and better program is promised and the officers anticipate an increased attendance and a large number of exhibits.

IN THE MARKET.

Glasgow, Ky.—The New Home Telephone Company has been organized and incorporated here by W. R. Gardner, W. F. Pardue, T. P. Dickenson and others, with a capital of $40,000. Will build a system, both local and long distance, in Western Kentucky, connecting the principal towns and cities. Construction material will be needed. Address W. F. Pardue, Manager, New Home Telephone Company, Glasgow, Ky.

Mackville, Ky.—The Cocanougher Telephone Company has just been organized here by Wesley Kimberlin, J. M. Coyle and G. W. Russell, to construct and operate a local, independent telephone system in Mackville. One line will also be constructed from Mackville to Peytons, 20 miles, where long distance connections will be made. Address G. W. Russell, Manager, The Cocanougher Telephone Company, Mackville, Ky.

Winchester, Ky.—The East Tennesse Telephone Company here will shortly build lines from Winchester to Crabtree and Allensville, 15 miles. Will need construction material. Address East Tennessee Telephone Company, Winchester, Ky.

Democrat, Ky.—The Upper Rockhouse and Beaver Creek Telephone Company has secured rights-of-way for a local, independent telephone line from Deane, via Millstone and Horn to Baker, where connections will be made with the Eastern Kentucky Home Telephone Company's lines. Address Dr. T. A. Cook, Manager, Upper Rockhouse & Beaver Creek Telephone Company, Democrat, Ky. Construction material will be needed.

Pound, Va.—The Pound Home Telephone Company, organized here by D. S. Gilley and others, will, it is announced, build local independent lines from Pound, via Dewey, to Flat Gap and Lipps, Va. They will operate an exchange at Pound. Their capital is $1,000. Construction material will be needed. Address D. S. Gilley, Manager, The Pound Home Telephone Company, Pound, Va.

Carr's Fork, Ky.—The Carr's Fork Home Telephone Company here announces some extensions of their lines and the installation of a new switchboard at Pine Top. A local, independent line will be constructed from Carr's Fork to Leatherwood, 20 miles. Construction material will be needed. Address Carr's Fork Home Telephone Company, Carr's Fork, Ky.

Thornton, Ky.—The Thornton Telephone Company are overhauling their lines from Thornton to Evans, and will also install an exchange at Lester. They will need some construction material. Address The Thornton Telephone Company, Thornton, Ky.

Sassafrac, Ky.—The Sassafrac-Brinkley Telephone Company has been organized here by Spencer Combs, Jr., and others, with a capital stock of $700. They will build local, independent system in Sassafrac, also a line from Sassafrac to Brinkley, the construction work to be begun within thirty days. Construction material will be needed. Address Spencer Combs, Jr., Manager, The Sassafrac-Brinkley Telephone Company, Sassafrac, Ky.

Hyden, Ky.—The Hyden Telephone Company here will shortly overhaul and repair their lines between Hyden and Manchester, which will require considerable new material. A new switchboard will also be purchased for their Hyden exchange. Construction material will be needed. Address The Hyden Telephone Company, Hyden, Ky.

Manchester, Ky.—The White-Burton Telephone Company has been organized here with a capital of $1,000. John G. White, S. M. White and Ira Burton are the stockholders. It is announced that they will build a local, independent line from Manchester, via Larue, to London, 26 miles. Construction material will be needed. Address John G. White, Manager, The White-Burton Telephone Company, Manchester, Ky.

Baxter, Ky.—The Baxter Telephone Company, recently organized here by Samuel Smith and others, will build system in Baxter besides constructing a local, independent line from Baxter to Evarts. Construction material will be needed. Address The Baxter Telephone Company, Baxter, Ky.

Colly, Ky.—The Letcher County Home Telephone Company will construct local, independent line from Baker, via Potters Fork and Chip, to Elkhorn Creek, rights-of-way having been secured. Construction material will be needed. Address Elzy Franklin, Manager, Letcher County Home Telephone Company, Colly, Ky.

Esto, Ky.—Russell Springs and Columbia Telephone Company, recently organized here, will construct telephone lines from Russell Springs to Columbia and Dawson Springs, 30 miles. They have just increased their capital stock to $3,000. Construction material will be needed. Address B. O. Hurtt, Manager, Russell Springs & Columbia Telephone Company, Esto, Ky.

London, Ky.—The London-Manchester Telephone Co. increases their capital stock from $2,000 to $4,000 and will make some new extensions, beginning at once. One new line will be built from London to Artemus and Barbourville, Ky. Construction material will be needed. Address, The London-Manchester Telephone Co., London, Ky.

Lowell, Ky.—The Lowell Mutual Home Telephone Co. has just been organized and incorporated here with W. H. Cowan, president., J. T. Sharp, secretary, J. M. Beard, treasurer, and A. J. Cowan, A. C. Mays and J. W. Looney, directors. They will build a local, independent system in Lowell. All construction material will be needed. Address, The Lowell Mutual Home Telephone Company, Lowell, Ky.

Glendeane, Ky.—The Glendeane Home Telephone Company here has been organized and incorporated with a capital of $1,000, by J. F. Garrard and others for the purpose of building a local independent system in and around Glendeane. Construction material will be needed. Address, The Glendeane Home Telephone Company, Glendeane, Ky.

Mayking, Ky.—Mayking Telephone Company is securing rights of way for the construction of a line from Mayking to Lima, Ky., which will be begun at once, as soon as the material can be secured. Address, Mayking Telephone Company, Mayking, Ky.

Indian Bottom, Ky.—J. M. Brown and others here are preparing to organize a company to construct a system from Indian Bottom via Ison and Tillie to Colson, Ky., to make an im-

portant connection with the Whitesburg Telephone Company. Building material will be needed. Address, J. M. Brown, Indian Bottom, Ky.

NEW TELEPHONE COMPANIES.

DELIGHT, ARK.—The Delight Telephone Company has been organized with a capital stock of $1,000, and the officers are as follows: President, W. H. Bowers; vice-president, R. W. Stell; secretary, G. M. Powers.

NORTH GOWER, ONT., CAN.—A new telephone company has been organized with a capital stock of $30,000 for the purpose of establishing a system in North Gower and Marlborough. The officers are: President, H. G. Blair; secretary-treasurer, J. A. Craig.

DECATUR, ILL.—The Macon County Telephone Company was recently incorporated to do a general telephone, telegraph and electrical business. The capital stock is $150,000, and the officers are as follows: President and general manager, Dr. J. W. Collins; vice-president, W. E. Surface; secretary, George S. Connard; treasurer, P. E. Kuhl. The purpose of the company is to control all of the telephone exchanges in the smaller towns.

FREEPORT, ILL.—Articles of incorporation have been filed for the Freeport Telephone Exchange Company, with a capital stock of $50,000. The incorporators are Fred M. Gund, Roy K. Farwell and R. R. Tiffany.

PITTSFIELD, ILL.—The Hadley and El Dara Telephone Company has been incorporated by M. C. Brown, Owen L. Fitch, W. H. Moyer, John Reeder, W. A. Elder and H. P. Glecker.

BENTON, ILL.—The Hamilton Utilities Company is the name of a new incorporation which has for one of its objects the construction and operation of a telephone system. The capital stock is $100,000 and the incorporators are Charles F. Hamilton, F. O. Hamilton and W. W. Hamilton.

STAUNTON, IND.—Articles of incorporation have been filed by John Holdifer and Joseph P. Tiefel of Brazil and Lafe Weaver of this place, for the Syester Telephone Company, with a capital stock of $1,000.

BRAZIL, IND.—The Jackson Township Telephone Company has been organized; capital stock $10,000. The directors are J. H. Hoffman, Willis McCullough, George Youngbrod, C. W. Evans and Ralph Ressler.

ELLWICK, IOWA.—Lewis Halvorson, Nels Buland, L. C. Amundson, Ed Aislager, Peter Bly, Albert Amundson and William M. Maakestad have organized the Lincoln Mutual Telephone Association with a capitalization of $2,000.

TOPEKA, KANS.—The Laughlin Secret Call Telephone Company has been incorporated with a capital stock of $100,000, by F. H. Butler, Kansas City, Kans.; D. J. Laughlin, W. L. Jones and F. E. Fessenden of Clyde.

CISNEY, KY.—The Rosewood Telephone and Telegraph Company has been incorporated by E. Thornberry, W. J. Jenkins and J. H. Smith.

CLARKSON, KY.—A. G. Burns, Jesse Whitten and R. B. Horrell have incorporated the Hickory Valley Telephone Company.

SPRINGFIELD, KY.—Articles of incorporation have been filed for the Cecil Telephone Company by S. M. Cecil, B. J. Cecil and W. J. Smith.

MACKVILLE, KY.—The Cocanougher Telephone Company is the name of a new organization formed by Wes. Kimberlin, J. M. Coyle and G. W. Russell for the purpose of constructing and maintaining a telephone system.

GLASGOW, KY.—The New Home Telephone Company has been incorporated by W. R. Gardner and W. F. Pardue, with a capital stock of $40,000.

CAMPTI, LA.—The Campti Telephone and Electric Light Company has been organized with the following officers: President and manager, Dr. E. W. Breazeale; vice-president, T. K. Giddens; capital stock $10,000. The company will take over the telephone system in this place and will extend its lines to other towns.

MONTVILLE, MAINE.—Articles of incorporation have been filed for the Center Montville Telephone Company, with a capital stock of $5,000. The incorporators are James J. Clement, president; George L. Edmunds, treasurer; Allen Goodwin, Albert O. Baker, Charles A. Boyton and others.

AUGUSTA, MAINE.—The Northwestern Securities Company is the name of a new organization formed by Lewis A. Burleigh and M. F. Sheehan, Augusta; E. M. Leavitt, Winthrop, president and treasurer; capital stock $500,000. The company has for one of its objects the construction of telephone lines.

VASSALBORO, MAINE.—The Webber Pond Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are Orrett J. Hussey, president; Charles W. Crowell, treasurer; Willard E. Strong, all of Vassalboro.

PORTLAND, MAINE.—The Continental Petroleum of America which has been incorporated by Clarence E. Eaton, president; Albert F. Jones, treasurer; B. M. Maxwell, G. Trott and J. R. Griffin, will carry on an extensive telephone business in connection with its other interests.

PIERSON, MICH.—The Pierson and Maple Valley Telephone Company has been organized by George Schaub, Peter Vos and Warren Field, all of this place.

ST. LOUIS, MO.—The St. Louis County Telephone Company has filed articles of association at Clayton. The company has $20,000 capital stock, fully paid, and its territory is in Carondelet Township, the extreme southern part of the county. The office of the company will be at the White House, fifteen miles from St. Louis. The directors are J. Arthur Christopher, secretary and treasurer of the Christopher Arch, Iron and Foundry Company; Henry Kortjohn and Edgar R. Simpson.

JEFFERSON CITY, MO.—Secretary of State Roach has issued a certificate of incorporation to the Abilene Independent Telephone and Telegraph Company of St. Louis, with a capital stock of $300,000. Stanley A. Jones of Chicago holds 2,996 of the 3,000 shares of the stock company. Henry L. Sittel, William T. Hardin, B. T. Shelton and Xenephon P. Wilfly, all of St. Louis, are also interested in the organization.

OSBORN, MONT.—The Riverside Telephone Company has been incorporated, with a capital stock of $10,000, by E. H. Hyder, J. H. Walker and A. A. Knowe.

RIVERTON, NEB.—The Rock Creek Corporate Telephone Company has been incorporated by Fred Garvin, A. G. Moren, R. C. Morer and Albert Douglas; capital stock, $1,200.

CURTIS, NEB.—Articles of incorporation have been filed for the North Star, Sheridan and Curtis Telephone Company, with a capital stock of $10,000. The incorporators are C. E. Brown, W. J. Johnston, F. H. Hecht and R. A. Wilson.

HENDLEY, NEB.—E. R. Kirste, J. H. Adams and J. O. Henry have incorporated the Hendley Switchboard Company, with a capitalization of $3,000.

SPAULDING, NEB.—The Spaulding Telephone Company has been incorporated by Gus Lichtenberg, F. J. O'Hara, J. H. Brownlee and G. N. Anderson; capital stock $10,000.

ROY, N. M.—The Roy Telephone Company has been incorporated, with a capital stock of $50,000, by Alice M. Tyler and Ada P. Shutt.

GREENE, N. Y.—The Smithville Central Telephone Company has been incorporated by Bert J. Rorabaugh, George F. Wells, George W. Smith, M. E. Crandell, Wm. S. Hallenbeck, of Greene; Albert B. Merriam and Herbert L. Aldrich of McDonough.

CANAAN, N. Y.—Articles of incorporation have been filed for the Edwards Telephone Company by Harry Nichols, Jacob Schilling, George T. Tremper, Oscar W. Ford, Frank Schilling and Frank Curtis.

ESSEX, N. Y.—The Essex Mutual Telephone Company has been incorporated, with a capital stock of $1,500, by Charles W. Tucker, Nelson A. LaRoe, P. H. Boyle, Edward W. Hoskins, W. H. Crookshank, Eugene A. Morehouse and Charles E. Porter.

HINCKLEY, N. Y.—The Hinckley and Grant Telephone Company is the name of a new organization incorporated by Charles A. Wilt, Roswell H. Popple, Daniel McArthur, Edward E. Lasher and William H. Davenport, of Grant, and John Fisher and Joseph Dwyer of Hinckley.

MARCELLUS, N. Y.—The Navarino Telephone Company has been incorporated, with a capital stock of $5,000, by Irving Rathburn, Fred Kinyon and W. C. Fisher, all of this place.

PORT DICKINSON, N. Y.—Articles of incorporation have been filed for the Port Dickinson and Trenton Telephone Company, with a capital stock of $500. The incorporators are W. T. Heney, Henry C. Hotchkiss, Theodore M. Macomber, William Bouck, Edward De La Vergne, Charles E. Prentice, Floyd O. Hotchkiss and Bert T. Stanton.

CARRINGTON, N. D.—The Haven Telephone Company has been incorporated, with a capital stock of $15,000, by F. C. Peterson and Albert Rosenau.

MOHALL, N. D.—The Mohall Telephone Company has been incorporated by R. H. Williamson and M. H. Williamson with a capital stock of $50,000.

BUFFALO CITY, N. C.—The East Lake Telephone Company has been incorporated by J. W. Turford, I. J. Edwards and D. M. Stringfield; capital stock $10,000.

ATHENS, OHIO.—Articles of incorporation have been filed by A. F. Holmes, W. E. Moler, S. M. Goodrich, C. L. Jones and

Arthur L. Moler with a capital stock of $25,000, $15,000 common and $10,000 preferred.

Sidney, Ohio.—The Farmers' Telephone Company has been incorporated with a capital stock of $24,000. The incorporators are John H. Millhouse, Charles F. Snyder, Oliver C. Staley, John C. Ward, C. N. Middleton, James M. Baker and George L. Martin.

Marietta, Ohio.—The Garby-Cady Telephone Campany has been incorporated by John Taylor, J. A. Stewart, C. W. Youngaley, C. W. Lenington, J. F. Taylor and M. D. Kline, all of this city; capital stock $10,000.

Hudson, Ohio.—Articles of incorporation have been filed for the Hudson Telephone Company, with a capital stock of $30,000. The incorporators are Clifford A. Neff, Walter S. Lister, Wm. C. Rhodes, R. A. White, Max E. Meisel, all of Cleveland.

Racine, Ohio.—The Racine and Letart Telephone Company has been incorporated by G. W. McDade, W. L. Johnson, C. O. Mills, Robert R. Hughes and W. P. Carver. The capital stock is $2,000.

Mount Angel, Ore.—The Mount Angel Telephone Company is the name of a new organization recently chartered, with a capital stock of $5,000. The incorporators are C. R. Houghman, Henry Klinger and G. D. Ebner.

Toledo, Ore.—The Lincoln County Telephone and Telegraph Company has been incorporated by W. K. Merrill and R. F. Patton; capital stock $10,000.

Muncy, Pa.—The West Branch Telephone Company has been incorporated by J. Russell Glass, J. Hess Bailey, E. Robb Swenk and Frank M. Opp; capital stock $10,000.

Cookeville, Tenn.—The Cookeville Home Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are V. E. Bockman, J. T. Shirley, W. C. Maxwell, S. D. Davis, J. S. Lewis, W. F. Tilley, W. L. Huddleston, R. A. Elrod and W. R. Poston.

Front Royal, Va.—Articles of incorporation have been filed for the Independent Mutual Telephone Company with a capital stock of $5,000. S. G. Waller is president of the company; Lovell Hoffman, vice-president; Wade Hunt, secretary and treasurer.

Watertown, Tenn.—The Watertown Telephone Company has been incorporated with a capital stock of $5,695. The incorporators are A. C. Phillips, C. C. Davis, E. P. Jennings, J. H. Payne, T. W. Moore, T. L. Blaird, J. F. Johnson, Andrew Williams and Robert Patton.

Princeton, Wis.—The Princeton Telephone Company has been organized by H. J. Maxwell, George T. Kreley and A. A. Kreuger.

Loma, N. D.—The Gordon Farmers' Telephone Company has been incorporated, with a capital stock of $7,000, by Henry Solberg, John Wentz, Fred Heimbecker, A. J. Lunde and John Baker.

Soper, Okla.—The Citizens ' Telephone and Telegraph Company has been incorporated; capital stock $20,000. The incorporators are B. W. Williams, Soper, Okla.; W. P. Stewart and A. A. McDonald, Hugo, Okla.

Middleburg, Pa.—The Middlecreek Valley Telephone Company has been incorporated, with a capital stock of $25,000, by G. Alfred Schoch, G. W. Wagonseller and John S. Kauffman of this place and James E. Magee, Kreamer, Pa.; T. H. Speigelmire, McClure, Pa.

Virgil, S. D.—Articles of incorporation have been filed for the Virgil Telephone Company with a capital stock of $10,500. The directors are J. H. Beck, president; N. H. Jansen and Peter Jones.

FINANCIAL ITEMS.

Grand Rapids, Mich.—The Citizens' Telephone Company has been granted permission to increase its capital stock from $3,500,000 to $5,000,000 to enable it to extend its system and provide for increased business.

Butler, Mo.—The Charlotte Telephone Company has increased its capital stock from $2,000 to $4,000.

Kansas City, Mo.—The capital stock of the Missouri and Kansas Telephone Company has been increased from $5,000,000 to $20,000,000 in order that stock to the amount of $15,000,000 might be sold to the American Telegraph and Telephone Company, to retire a like amount of indebtedness due from the Missouri and Kansas company to the American Telegraph and Telephone Company.

Grand Island, Neb.—The railway commission has permitted the Grand Island Telephone Company to increase its capital stock from $75,000 to $100,000 for the purpose of extending its cable plant and its local plant.

Harrisburg, Neb.—The railroad commission has allowed the Western Nebraska Telephone Company to exchange $5,730 of stock for property acquired in the reorganization of the company.

New York, N. Y.—The New York Telephone Company has filed a certificate with the secretary of state increasing its capital stock from $100,000,000 to $125,000,000, of which $85,672,800 has been issued.

Mansfield, Ohio.—The capital stock of the Mansfield Telephone Company has been increased from $350,000 to $1,000,000.

Shellsville, Pa.—The East Hanover Telephone Company has decided to increase its capital stock to $25,000.

Landisburg, Pa.—The capital stock of the Perry County Telephone Company has been increased from $4,000 to $20,000.

Nashville, Tenn.—The Temperance Hall Telephone Company has increased its capital stock from $1,000 to $25,000.

Spokane, Wash.—The Washington Southern Telephone Company has increased its capital stock from $100,000 to $700,000. The company now operates to the limits of this city, making connections over the lines of the Home Company and it is its purpose to extend its lines to the coast. Exchanges are now being built along the route and possibly the company may enter Portland.

Lansing, W. Va.—The capital stock of the Lansing Telephone Company has been increased from $5,000 to $30,000.

Stratford, Wis.—The Stratford Telephone Company has increased from $1,500 to $4,000.

Baldwin, Wis.—For the purpose of making improvements, including the replacing of its wires by cables, the Baldwin Telephone Exchange has increased its capital stock from $25,000 to $50,000.

Kaysville, Utah.—The Davis County Independent Telephone Company has increased its capital stock from $40,000 to $250,000, and has changed its name to the Home Telephone and Electric Company.

RATES.

Columbus, Ind.—New rates have gone into effect on several independent telephone lines in this part of the state. The companies operating exchanges at Edinburg, Hope, Lewis Creek, Cave Mills, Marietta and Smithland are in the agreement. The rates for residence telephones have been increased from $1.00 to $1.25 a month, and the rates for business telephones from $1.25 to $1.50. Free service is to be given when the call passes through only one exchange. When more than one exchange is called in making connection there will be a toll charge.

Chilton, Wis.—The Eastern Wisconsin Telephone Company has applied to the Railway Commission for permission to increase its rates 25 per cent.

FRANCHISES ASKED AND GRANTED.

Quincy Cal.—The board of supervisors has sold to William E. Hillis a franchise to construct telephone and telegraph lines extending through Keddis, Indian Falls, Crescent Mills, Greenville and Prattville.

Manning, Iowa.—A 20-year franchise has been granted the Manning Telephone Company to construct and operate a telephone system in this place.

Ottawa, Kans.—The Home Telephone Company of Kansas City, which operates a system in this place, is seeking a new franchise which will enable it to raise its rates. If granted the company contemplates the reconstruction of its plant at an estimated cost of $75,000.

Scottsville, Va.—The town council has granted a franchise to E. W. Twyman of Charlottesville, who will at once organize the Scottsville Telephone Company, which will construct and operate telephone lines in the counties of Albemarle, Fluvanna and Buckingham and Scottsville.

Cheney, Wash.—An ordinance was recently introduced granting to the Washington Southern Telephone Company a franchise to enter this city, but upon receipt of a letter from C. P. Lund, president of the present telephone company in this city, which promised a much improved system in the way of new quarters, an enlarged switchboard and common battery system, an expenditure of several thousand dollars, it was thought best to give the present company a chance to improve before granting a franchise to a new company and the ordinance was laid on the table.

Ashland, Ohio.—The Star Telephone Company has filed with the probate court application for a new franchise permitting it to operate in this city.